of my earlier splints: "The surgeon must make a splint to fit the limb—not the limb to the splint."

For leg, arm and finger splints, it requires no special skill to obtain superior results with my material. A study of the accompanying illustrations will indicate this. No. 1 is that of a splint for fixation of the left thumb, including its metacarpal bone. No. 2 shows an anterior knee splint for making immobile the knee joint; with a reinforcement controlling the quadriceps femoris it may prove useful in fracture of the patella. No. 3 represents a splint molded over the inner side of the right arm as it hung limp by the body, the palm against the thigh.

In complex cases the genius of the surgeon and his handicraft can shine forth in the creation of apparatus suitable for the case.

Apparatus heretofore impossible or rare because of its cost or the necessity for employing skilled tradesmen, will become plentiful.

Finally, knowing the properties possessed by this material, it requires but little foresight to comprehend the evolution in the near future of radically new apparatus for the treatment of various surgical affections.

In concluding, I feel happy to here express my hearty acknowledgment and thanks for suggestions and kindnesses tendered me by Drs. H. P. Bowditch, M. F. Gavin, G. W. Gay, H. M. Marcy and D. W. Cheever of Boston; also, to Dr. W. M. Conant, who very courteously placed suitable hospital cases at my disposal, when experimenting on the material.

ON SOME POINTS CONCERNING CLUB FOOT.

Abstract of a clinical lecture delivered at the Children's Hospital, Great Ormond street, London, May 11, 1893.

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[ABSTRACTED BY A. M. PHELPS, M.D., NEW YORK.]

Mr. Owen recognizes the two forms of equino varus, viz: the congenital and acquired, and also calls attention to the fact that one variety is much more easily cured than the other. He inclines to the belief that pressure in utero is one of the chief causes of the deformity. I quote:

"Probably, after all, the cause of the congenital deformity is the faulty packing of the foetus in utero. Here I show you a specimen of a foetus taken by surprise, as it were, and removed at about the sixth month. You will notice that the heels are markedly drawn up and the soles turned inwards. Often after a premature labor we find the feet folded flat upon the front of the chest, and much more inverted than in the specimen I have just handed round. It is a very suggestive fact that no other variety of club foot is found as a congenital defect. Only once have I met with a congenital instance of *talipes valgus*. I suppose the explanation is, that when the foetus is in utero, the muscular walls of the uterus can easily press and invert the feet against the front of the chest, while it is well nigh impossible for the uterine walls to turn the feet with the soles everted. The extreme inversion is evidently to insure the most convenient packing in utero; the foetus could not be snugly packed in utero with the soles turned out in the position of *talipes valgus*."

He teaches that the treatment should be commenced immediately after birth by manipulation

and fixation, "that the various fibers which are binding the foot in a faulty position may be the more easily stretched."

"Here is a boy whose foot illustrates the contraction of the plantar fascia—a case of paralytic equino varus. The case shows only in a moderate degree the double deformity, but it well illustrates the creasing across the sole; by pressing with the finger when the foot is in a somewhat corrected position, you will feel the very tight band which is caused by the plantar fascia. The structures needing attention, then, are the skin, the tendon of Achilles, the tibialis posticus, the flexors of the toes, the tibialis anticus and the plantar fascia. Last, we come to the anterior part of the internal lateral ligament. This is a very obstinate element in maintaining the deformity after the tendons have been divided. Students, as a rule, do not understand the importance of the internal lateral—the deltoid ligament. It is attached above to the internal malleolus, and below it spreads into the sustentaculum tali, and (which is the important point) forward on to the scaphoid bone. As a matter of fact only a comparatively small part of the internal lateral ligament runs to the astragalus; a good deal of it goes to the os calcis, and still more to the scaphoid bone; so that, if the foot has been cramped in the position of equino varus, it is impossible to straighten it out correctly, unless the anterior part of the internal lateral ligament which runs from the internal malleolus to the scaphoid bone is effectually dealt with. (This dissected specimen of a club foot shows the strong, anterior part of the internal lateral ligament holding the foot rigidly against the lower end of the tibia.)"

"I said a few minutes back that it was a matter of great concern to the surgeon whether the club foot which he was called upon to treat was a congenital defect, or the result of a central nervous lesion; the congenital defect being much more amenable to treatment than the deformity which is the result of infantile paralysis. And so marked is the difference in the result of the treatment in these two classes of cases, that there are some surgeons who absolutely refuse to operate at all in equino varus, which is the result of paralysis. No surgeon can get a very brilliant result in such cases, but with vigorous treatment he may get, as I shall show, a very fair one."

In the treatment of babies suffering from congenital talipes varo equino I quote the following:

"As regards the treatment of the congenital equino varus, as soon as the child has been washed the manipulations are to be begun by the surgeon trying to put the foot into an improved position. He will gain a little every time. He takes the ankle in one hand, and grasping the foot with the other, he flexes the foot; that is, he brings down the heel, and he gently but firmly everts the foot. Every time he goes to see the mother he must resort to this little maneuver, and he must also get the monthly nurse to help in the intervals of his visits. Three times a day, or oftener, the nurse is firmly to flex the foot; and little by little the skin and the ligaments and the tendons will yield, and the foot will come into the improved position."

"Should the case be neglected, it will return to the hospital with a relapse."

"The mention of this word 'relapse' causes me to make a remark in connection with the treatment of club foot; you hear, or at any rate I hear sur-

geons of experience in connection with club foot, say that they never have, or have had, a relapse after treatment, and that they would be ashamed if any of their cases did relapse. When I hear them publicly talk like this, my thoughts revert to Ananias. Relapses there must be in the treatment of club foot, unless the surgeon is constantly watching over the case day after day and week after week, and it may be year after year; and how rarely can this effective supervision be insured. Relapses there are and must be in the practice of every surgeon.

"I never see relapses in cases which I am permitted to handle after operation."

"But to return: The treatment of the simple congenital defect consists, then, in manipulation—vigorous, it may be—so that the anterior part of the internal lateral ligament and other structures may be well stretched. But suppose after several months of this procedure, although the gain is considerable, it is insufficient—something else must be done; and that should be subcutaneous section of the tendon of Achilles. It is inadvisable and useless for the surgeon to struggle against this strong and resisting structure. If he finds that he is not making sufficient progress, let him divide it first and foremost, and he will then obtain a fresh start. If you turn to your works on orthopedic surgery you will find it advised that section of the tendon of Achilles should always be left to the last division; but I say, let this tendon be divided *first* of everything, as it is the most important element in holding the foot in the wrong position."

He explains correctly that division of the tendon of Achilles not only allows the heel to come down, but also the inversion is overcome. I quote:

"Possibly I have not made myself sufficiently clear. Let me show what I mean upon this cast. Here is the tendon of Achilles running to its insertion, the heel being in the mid-line. The contraction still takes place in the tendon of Achilles, and the heel, which is fairly movable under the astragalus, becomes rolled inwards. This is not theory, it is an actual fact; and when in these cases the tendon of Achilles is divided, not only does the heel come down, but the inversion is corrected."

"How do you know that any individual case of equino varus that you have to treat, is not one of those cases in which simple division of the tendon of Achilles may not effect so much improvement? Divide the tendon of Achilles first and see. That is the only way to find out. I stand by the assertion that the tendon of Achilles should always be divided first, when we are operating for equino varus. Sometimes this simple tenotomy suffices in the way of operation; often other tendons have to be divided as well."

Mr. Owen graphically pictures a case treated by subcutaneous work in the following words:

"Let us in our charity suggest it is a case of relapse, a case which has been under somebody else, and the child is four or five years old. Evidently manipulations, frictions and massage will not suffice for the effacement of the remaining deformity. The tendon of Achilles is to be divided first. Then, perhaps, the tendon of the tibialis anticus and that of the tibialis posticus, subcutaneously, if you will; and subcutaneously the plantar fascia shall be divided; and subcutaneously everything else shall be divided which prevents your getting the foot into

the improved position. But in my experience this subcutaneous surgery has not been altogether satisfactory. In any case, for instance, the skin prevents due unfolding of the foot. Of course if a surgeon asserts that he never has a relapse, and that he resorts to no more severe method of treatment than that of subcutaneous division of these structures, then I shall say, granting that all he says is true, by all means let him continue; but my experience in hospital practice, and especially with the out-patient class, is that subcutaneous operations do not effect enough. How, then, is a case of relapsed or neglected club foot to be dealt with? You shall perform the subcutaneous divisions of tendon and fascia, if you will, and in a slight case this operation will suffice.

"I remarked a little while ago that the skin formed a considerable element obstructing the reduction of the double deformity; and it was partly in recognition of this fact that Phelps of New York suggested an extremely radical measure in the treatment of talipes. Recognizing the fact also that the days are fortunately past in which open wounds are followed by inflammation, suppuration, or some form of blood poisoning, Phelps boldly suggested that a free incision should be made into the inner border of the sole of the foot, and that every structure which opposed itself to the perfect correction of the deformity should be thoroughly and effectually divided. This open operation of Phelps' is the operation which I am performing a good deal in connection with these cases—not, of course, in the treatment of every young child, or of any child with a slight deformity, but in the case of a child with a neglected, or an extreme deformity. And I am anxious to advocate it as warmly as I can to-day. I have never found any occasion to regret having resorted to Phelps' operation; but on the contrary have every reason for speaking of it in the highest terms. It is performed as follows: The tendon of Achilles is of course first divided, and, with a good deal of brute force, the surgeon does his best to get the foot into the improved position. A vertical incision is then made on the inner side of the foot a little in front of the internal malleolus, over the head of the astragalus. The incision will probably expose the internal saphenous vein, and this is sometimes divided in the operation, though sometimes the surgeon is able to complete the operation without dividing it; but if it is cut it is no great matter. After that he divides the tibialis anticus and, in the lower part of the incision the tibialis posticus, as it runs round to its insertion."

"The plantar fascia is then cut and some of the abductor of the great toe, and then, deep in the sole, the surgeon meets with the long flexor of the toes. Then, using some force still, he improves the position of the foot. Proceeding further he cuts the anterior part of the internal lateral ligament, at the same time exerting more energy upon the foot, and making a wide separation between the head of the astragalus and the scaphoid. Thus he is enabled to get the foot into the straight line, and, breaking through any remaining fibers that resist, he bends the anterior segment of the foot right back, opening the calcareo-cuboid joint, in all probability. When he is satisfied that nothing remains to impede the easy effacement of the deformity, he gently fills the gaping wound with mercuric gauze, and encloses the foot in lateral splints of house flannel which have been soaked in creamy plaster of Paris. In fixing up the

foot it is by no means necessary to use force or restraint, for no resisting elements remain. It is advisable in fixing the foot to have the deformity over-corrected, trusting to the growth of granulation tissue to fill up the wedge shaped cavity. Sometimes the dressing has to be reapplied next day, but as a rule, the foot remains undisturbed for ten or fourteen days. In some cases, indeed, I have allowed a longer interval to elapse before disturbing the first dressing."

In my earliest operations, I was half afraid lest the anterior segment of the foot should slough, but I have never had such apprehensions realized. In fact, it looks as if it might almost have been by design that the large artery of the foot, the external plantar, was specially placed along the outer part of the sole so that it might offer no hindrance to the surgeon who contemplated a resort to Phelps' open method of operating for talipes equino varus. In the course of eight weeks—more or less—the wound is quite healed, epidermis has grown over its surface, and the mass of granulation tissue which filled the space is being converted into strong fibrous tissue for the consolidation of the foot.

"I must just briefly allude to other operations. Possibly next time I shall have to say more on this subject, but merely for the sake of making comparison between Phelps' operation and the other operations which pass under the name of tarsectomy—cutting out a piece of the tarsus. In Phelps' operation nothing is cut away. But in the operation of tarsectomy it may be that the cuboid is removed, or that a wedge is taken from the outside of the foot, the base of the wedge being outwards and implicating various bones of the foot. Or it may be that the astragalus is taken away, so that the structures running from the leg to the foot are slackened, and that the os calcis may fall into its position between the two malleoli. But whichever of these forms of tarsectomy is adopted, there is—there must be—a considerable loss of tissue, for the improvement in the position of the foot is effected by a shortening of the external border of the foot. But in Phelps' operation the improvement is effected by the sacrifice of no tissue whatever, but by the insertion of a wedge of space, as it were, on the inner side of the foot. Thus, when the various resisting structures have been divided, a large gap exists between the head of the astragalus and the posterior aspect of the scaphoid bone."

"I show you here a boy whose case was most unpromising for any operation for talipes; the boy with infantile paralysis on whom I was demonstrating a little while ago. Unfortunately, I have no cast or figure to show the position in which the foot was before his operation. Kindly take my word for it that the deformity was extreme and the prospect unpromising. I performed Phelps' operation upon the foot, dividing everything, and now we have the foot in a very fair position; I think we may say a very excellent position, with no inclination whatever to relapse. Now I am sure of this, that no subcutaneous operation could have effected such an improvement as this open operation has effected, and no tarsectomy could have brought about so great and real an improvement, because in that operation the foot is necessarily robbed of most important elements. The result in this case, so far as it goes, is extremely satisfactory. On being made to walk the

patient gets his foot very flat, as you see. A most important point in this operation, and one on which Phelps insists very strongly and rightly, is that the malposition must be *over-corrected*. Relapse is not very likely to take place, but if you get (if I may use the expression) well to windward of the defect, it matters less if contraction does take place. It is a little heterodox to say that after an operation on club foot the foot should be put in the over-corrected position. In the textbooks you will probably find the advice still given to put up the foot in the old position for a certain length of time, so that the plastic effusion which takes place between the cut ends of the tendon may be gradually stretched. But the answer to that is that the ends of the tendons should be as wide apart as possible, that the little inflammation which is set up by the operation will be followed by the formation of a certain amount of granulation tissue, that this granulation tissue will be converted into fibrous tissue, and by this means a sufficiently long splice may be put into the tendon; and not only a longer splice than you would get if you put up the foot in the old position again, but a stronger splice. If you were putting the foot up in the old position and then gradually stretching the union between the cut ends of the tendon, with each stretching you would be sure to get an attenuation of the uniting mediums and a weakening of the tendon. You would get a less strong band of union between the cut ends than if you boldly and at once put the foot up in the over-corrected position."

"Here is a baby on whom Phelps' operation was performed for double congenital equino varus. Now it is said, and I think very fairly, that in a young child so severe an operation as that of Phelps should not be resorted to. I think it is fair criticism, but I will say that if Phelps' operation is going to give a favorable result in a biggish child, why should it not be resorted to in the case of a little child? In every case of a little child I would not resort to Phelps' operation; but here is a very little child, not a year old, with double equino varus, on whom I did perform Phelps' operation on each foot, and see how strong the feet are, and in what a very satisfactory position they remain. This child I have seen nothing of since it left the hospital after the operation months ago; that is to say, there has been no after treatment needed. There is nothing like a flail-like condition in the feet. They are quite solid. If we had done a simple subcutaneous tenotomy in this case, and sent the child away, the mother or friends would not have been able to look satisfactorily after the child, and in all probability, relapse would have taken place. My experience has been mostly with hospital patients. There are other surgeons who deal chiefly with private patients, and of course they can have them longer under supervision, and show excellent results with subcutaneous tenotomy. But, by the hospital surgeon, the open operation has but to be practiced to be appreciated."

"What about a Scarpa's shoe? It is quite out of date. If it is used, unless the child is seen almost every day, it will almost certainly give rise to an excoriation or a sore place. Plaster of Paris is far better. But in the early cases the less, if any, retentive apparatus, the freer the leg and foot, the better for the subsequent development."

"Here is a boy sixteen months old, and these are casts of his feet before operation. The case is not

now quite so satisfactory. On the right side there is still a little inversion, notwithstanding all the structures named having been divided. The inversion which persists is, I think, sure proof that after Phelps' operation a limp splay foot is not the result. On the right side, the foot is in a very excellent position, but on the left side, there is just this little inversion, which I believe will be easily corrected by simple manipulation. I do not think that any further operation is needed. I have not seen this child for months."

"It is a point in favor of Phelps' operation, that when you have divided all resisting structures, there can be no more contraction of them. You have done the work and the child will hardly require looking after. As we are going to operate this day week, on this boy (case previously referred to), I shall be able to show exactly the method of treatment; but I may say in passing, that after the large wound has been made, the cavity is generally stuffed with a little mercuric gauze, and that the foot is then fixed in the position of over-correction. I here show you this other boy, operated on two years ago, when he was a year old. This was a case of extreme equinovarus. There is no attempt at inversion here, and the boy, who has had plaster of Paris on, if he could stand could get his foot well to the ground. The foot has nothing like a flail between the anterior and the posterior segment of the foot."

RELIEF FROM PAIN IN LABOR.

Read before the Section on Obstetrics and Diseases of Women, at the Forty-fourth Annual Meeting of the American Medical Association.

BY I. N. LOVE, M.D.

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As physicians, we may well ask ourselves if we sufficiently appreciate the importance of saving our patient pain. I will say that pain in the abstract is conservative, that it is the announcement on the part of nature that something is wrong and needs correction, and that we should be very guarded in relieving pain for fear of removing nature's flag of distress rather than removing the cause, but the arguments which will apply to pain which is an evidence of disease are not in my judgment apropos to pain as an accompaniment of parturition.

In the primitive state, undoubtedly woman was possessed with great muscular force and absence of nervous sensibility. Civilization, social customs, modern habits of life have developed the nervous centers at the expense of the muscular tissues, and we have in these latter days women who may truly be termed sensitive plants, whose muscular force is below par and whose nervous systems are "on edge" as it were.

I have made it a rule for many years to insist upon a thoroughly cleared out condition of the alimentary canal upon the part of every woman under my care during the entire term of pregnancy; at the same time I have encouraged elimination on the part of the other excretory organs by the liberal administration of Garrod-Spa water, freely flushing out in this way the kidneys at frequent intervals. The activity of the skin I have encouraged by frequent warm baths at bedtime. This latter has aided in the direction of a greater degree of restfulness which is important.

As every one knows, the average woman is constipated; doubly so during pregnancy, and there are double reasons for making efforts to remove this condition, because the interests of two people are involved instead of one. When I have evidence that labor is near at hand, I give my patient an increased amount of purgation. Immediately following the termination of labor I again purge freely with a view to the better clearing out of the alimentary canal and the removing of accumulated poisons. When I graduated in medicine, the instruction was given me to wait until the third day after confinement before evacuating the bowels. The same argument presented in favor of purgation as a preventer of peritoneal inflammation following abdominal sections, rather than opiates, will apply to the parturient woman. Constant, careful regard for all of the excretory organs, the keeping of the animated system of sewerage thoroughly cleared out, will in my judgment in the majority of cases eliminate puerperal convulsions from the nosology of the accoucheur. So much for elimination.

Now with regard to the best good of our patient from the standpoint of prevention of pain. We all know that the pregnant woman is prone to having her nervous system out of joint; in fact, the condition in itself is a severe test to the female nervous system. It is needless to recall to your mind how the very beginning of pregnancy is announced in many cases by peculiar nervous phenomena. During the entire term the imagination of the woman often becomes exalted or depressed. Her disposition is irritable. In many cases she is continually between two fires; upon the one side the greatest gloom, upon the other an excessive joy. Suspicion, jealousy, general sensitiveness are present, which under other conditions are never dreamed of. Nervous pains abound, migrainé, facial neuralgia, toothache, itching in various parts of the body, together with smarting and other evidence of irritation of the peripheral extremities of the nerves. The most grave nerve troubles sometimes are present; eclampsia, chorea and often mania. Truly we have evidence in favor of the thought that pregnancy is a severe test to the stability of the nervous system.

It is absurd to talk of pregnancy as being a physiological condition; as much so as the eating of one's dinner and the digestion of the same. Under primitive conditions it probably was so, but surely not under the conditions which prevail in this latter decade of the nineteenth century. How many of us have seen the last months of the pregnant woman made miserable by continual aches and persistent pains throughout the abdominal region and other parts of the body where there has been a disturbance of the circulation owing to pressure upon the vessels. Unless this condition of affairs receives attention the average pregnant woman is in poor shape for meeting the ordeal which faces her at the close of her nine months' siege. I consider it our duty to guard the nervous system during this siege as carefully as we have guarded the eliminative organs. We will find that attention to elimination will help us in our service as a pain reliever during these months of trial. The engorgement in certain parts of the body is less; the removal of ptomaines and other poisons, the activity on the part of the secretory system of glands renders the nerve centers less sensitive and less easily demoralized. At the same time