Will Dr. Jennings say something of the essentials of medical treatment?

DR. S. P. BEEBE, New York: It was not my purpose to advocate the removal of tonsils and adenoids as a cure for exophthalmic goiter. If any one has so understood my statement, I wish to correct it. What I have said about the frequent occurrence of infected areas in the nose and throat is derived from the history of approximately 3,500 patients who have had this disease. It is quite possible for one to have had a number of patients with thyroid disease who have not at the same time had either sinus or throat infections. Nevertheless such infections are a most common accompaniment of thyroid disease, and, in my judgment, constitute an important factor in maintaining a condition which favors overactivity of the thyroid gland. One cannot see the effect of repeated infections in these patients without being impressed with their importance. I wish, however, to impress the importance of making every effort to discover the beginning of thyroid disease. As specialists you will frequently be consulted by parents who bring their children to you for nose and throat infections. The patient may not have been seen by an internist at any time and, unless the physician who does see them examines the patient with reference to his general condition, as well as to determine the condition of the nose and throat, many diagnoses that might be made will be missed. Routine examinations of the nose and throat should include an examination for any possible enlargement of the thyroid gland. Simple tonsillectomy or removal of adenoids is not all that it is necessary to do in the line of treatment even in these early cases, but the custom of regarding a thyroid enlargement as of little medical importance unless accompanied by marked or severe symptoms is an error too commonly made at present. When the thyroid disease is well developed and the gland itself has undergone a marked pathologic change, there is no reason to suppose that a cure will be obtained simply by attention to the nose and throat infections. A recurrence of thyroid disease after repairing the nose and throat does not controvert the necessity for attention to such a condition. The most important thing in this work is to prevent the serious thyroid disease which has insidious beginnings, and these patients so often come to the nose and throat specialists first that it is of decided importance that the beginnings of thyroid disease should not be overlooked at a time when the patient's recovery is a comparatively simple matter.

THE USE OF CELLULOID SPLINTS IN THE TREATMENT OF DISEASES OF THE NERVOUS SYSTEM *

G. WILSE ROBINSON, M.D.

KANSAS CITY, MO.

In the treatment of diseases of the nervous system as in the treatment of other diseases, the attending physician must measure the success of his treatment by the preservation of the life of the patient and the restoration of function in the anatomic structures diseased.

Of those diseases which endanger life and disable the patient by paralyzing muscles, groups of muscles and entire members, poliomyelitis stands as the most common type. During the acute stage of this disease the patient should rest in bed, the nares should be washed with a 1 per cent. solution of hydrogen peroxid, hexamethylenamin administered, and the pains controlled by the application of heat or by the giving of analgesics, if needed, and lumbar puncture done if there be signs of meningeal irritation.

After the acute stage is passed the physician must interest himself in and direct his treatment toward the restoration of muscular function and the prevention of deformities. The restoration of muscular function can be encouraged and facilitated by massage, electricity and exercise. The paralyzed muscles should be tested with the faradic current and if they respond to faradic stimulation two weeks after the onset of the paralysis, recovery should be expected. If they do not so respond, recovery may take place if the proper treatment be instituted. The electric current which gives the best therapeutic results is the galvanic. It is the characteristic tendency of poliomyelitis to paralyze individual muscles and groups of muscles, and it is for this reason that deformities are so prone to occur.

The prevention of deformities is the most important part of the after-treatment of poliomyelitis. They occur with great frequency, and are to a much greater degree responsible for the permanent disabilities of the patient than are the paralyses. In but a small percentage of patients is the paralysis so extensive and disabling in character as permanently to prevent walking, but the deformities so cripple a large percentage of patients that walking is very difficult or impossible. General acceptance is given to the idea that paralyzed muscles should be placed and fixed in the position of rest, should not be overstretched by the action of non-paralyzed antagonistic muscles, and should be supported in order that they may be used as their condition will permit.

Numerous and various methods have been suggested by which rest, relaxation and protection of the paralyzed muscles can be secured. Simple rest in bed is considered adequate by some, others apply a splint so as to fix the limb in normal position, while others splint the limb so that the paralyzed muscles are completely relaxed and the antagonistic muscles are hyperstretched. I do not presume to say that any of these methods are bad, either absolutely or relatively. Any one of the three methods can perhaps be applied with success to individual cases.

It is my opinion that all limbs paralyzed by poliomyelitis should be fixed in the normal position of rest, so that the paralyzed muscles cannot be overstretched, and held in such position by a splint which gives sufficient support to enable the patient to walk during the stage of repair, thus applying a physiologic stimulus to aid the recovery of the affected muscles.

Contractures begin to develop early in poliomyelitis and protection should be given to the paralyzed muscles from the onset. The most common of the early deformities is toe-drop, occurring as a result of the contraction of the flexors of the toes and of the extensors of the foot, in the absence of the action of the opposing muscles. As this deformity is hastened by the weight of the bedclothes a cradle should be used when it is expected.

As soon as the pain has subsided sufficiently to enable the paralyzed structures to be handled without occasioning too much discomfort, a splint should be applied for the reasons given above.

As a material for the making of such splints I believe celluloid has many advantages. Celluloid splints are simple, effective and cheap, and most successfully meet all requirements. They keep the muscles at rest in a position of relaxation, prevent deformities and enable the patient to walk while repair is progressing. They can be worn both day and night with

* Read before the Section on Nervous and Mental Diseases at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

entire comfort, do not absorb moisture, are sufficiently strong to support an adult, and yet are very light—those for a child weighing from 10 to 14 ounces and those for an adult from 24 to 32 ounces—are readily removed in order that the limb may be washed, massaged or treated with electricity and can be reapplied without difficulty. In more than 85 per cent. of the cases the muscles of one or both legs are affected, but in about 40 per cent. they are affected in combination with the muscles of the trunk, arms and neck. In 15 per cent. of the cases the legs are not affected, but the celluloid splints can be applied to the arms, trunk or neck and perform the same functions as when applied to the legs.

CLASS OF CASES SUITABLE FOR SPLINTING

All cases of paralysis of the legs are suitable for splinting, except those with complete loss of power in the psoas and iliacus group and in the glutei. Those cases in which the back, lumbar and abdominal muscles are much affected are also unsuitable for splinting, but if there be considerable affection of the dorsal and abdominal muscles with little involvement of the legs, a spinal jacket is very helpful. The extent of the splint must vary according to the degree of the paralysis. If the leg be extensively paralyzed, the splint should encompass the entire leg as high as the tuber ischii behind, the trochanter on the outer side and the ramus of the pubes on the inner side. If the paralysis be limited to the muscles below the knee a splint reaching to the knee will suffice.

Celluloid splints have been found most useful in the treatment of the paralyzes and in the prevention of the deformities of poliomyelitis, but they have a much wider range of usefulness. They are of benefit in the treatment of the wrist-drop or toe-drop associated with lead or alcoholic neuritis, or that from any other cause. They are also of value in the treatment of hemiplegia, with contraction and inversion of the foot, and in contracted conditions of the hand. They will prevent deformities if applied early in the diplegias of infancy and in myelitis.

The celluloid splint is of much value in the treatment of some conditions occurring in tabes, in hypotonia with hyperextension of the knee, they support the knees and enable the patient to walk. In Charcot's disease of the knee-joint they give support, so that the patient can walk without the danger of the knee suddenly giving way, and the fixation with pressure limits the extension of the disease and the effusion which often takes place within and around the joint. In order that the best results may be obtained the patient with Charcot's disease should rest in bed for several days before the cast for the knee is taken, so that the edema and swelling of the joint may subside, otherwise the splint will shortly be too large.

We are indebted to Calot¹ of Berck-sur-Mer for using and bringing celluloid splints to the attention of the profession. Gauvain² introduced them into England and used them in the treatment of tuberculous joints. To him belongs the credit of much of the improved technic in making them. Dr. Frederick Batten³ of the National Hospital for the Paralyzed and Epileptic, and of the Great Ormond Street Hospital for Sick Children, London, proved their great value in the treatment of poliomyelitis and other diseases of the nervous

system. Dr. Batten, relative to his experience with them, says⁴: "I have used them frequently during the past two years in the treatment of cases of poliomyelitis, and they have proved of the greatest service in preventing deformity and hastening recovery."

MAKING THE SPLINTS

The following processes are involved in making the splints:

1. The taking of the negative cast of the part to be splinted.
2. The making of the positive cast from the negative.
3. The building of the splint on the positive cast.

The details of these three processes are to be given, but I desire to emphasize the importance of the first process. The negative cast should be applied by the physician and it is essential that it be made properly, otherwise it will be useless.

THE NEGATIVE CAST

For the purpose of making the negative cast the following articles are required: a strip of lead $\frac{3}{4}$ inch wide and 2 or 3 feet in length, some oil, a strong knife with a sharp point, and some plaster-of-Paris bandages. For this purpose the ordinary surgical bandages are really not suitable. Batten recommends a bandage made of book-muslin, $4\frac{1}{2}$ inches wide and from 4 to 6 yards in length, loosely wound and not too heavily loaded with plaster.

The part of the body of which the cast is required is first shaved, if hairy, and then oiled. The strip of lead is oiled and adjusted to the point at which the cast is to be opened. The limb is now placed and held in the position in which it is to be fixed by the splint. As stated above, one of the most important functions performed by a splint to a disabled leg is to enable the patient to walk during the process of repair. If the leg be splinted with the knee hyperextended and the foot dorsiflexed on the tibia, walking will not be possible. The knee should be slightly flexed and the foot held exactly at right angle with the tibia. The plaster-of-Paris bandages are placed in warm water and after being squeezed out are wound round the limb, starting at the periphery and working up. The best results will be obtained if each bandage is taken continuously from one extremity of the cast to the other. If this be done the tendency of the cast to crack transversely will be much lessened. It is not necessary that the cast be very thick; four or five bandages for the entire leg of a child from 6 to 8 years old will be ample. The plaster will usually set in from three to five minutes. After it has set sufficiently a cut is made down to the lead. Before manipulating the cast be sure that all threads are divided, or a portion of the cast may be pulled out of place and the cast spoiled. The cut edges of the cast are now separated and the lead removed through the incision; the edges are still further separated and the cast is gently removed from the limb. In the case of the leg, if an assistant will grasp the toes and pull them forward while the cast is pushed backward little difficulty will be experienced.

After the removal of the cast the cut edges are carefully approximated and a single layer of plaster bandage wound round the cast from one end to the other, the lower opening being carefully closed with the bandage. This completes the negative cast and it is laid away to dry.

1. Calot: *Orthopédie Indispensable*, Paris, 1913.

2. Gauvain: *Brit. Med. Jour.*, 1913, i, 1200.

3. Batten, Frederick: *Lancet*, London, 1912, i, 80.

4. Batten, Frederick: *Clin. Jour.*, 1913, xlii, 5.

THE POSITIVE CAST

The time required for the negative cast to dry is from twelve to twenty-four hours; after it has thoroughly dried the positive cast may be made. The inner side of the negative cast is well oiled; a bamboo cane or small stick of wood of adequate strength to support the positive cast and several inches longer than the negative cast is placed down the center. The plaster-of-Paris is now mixed in the usual manner, poured into the cast and allowed to stand for about twelve hours. An incision is made through the single layer of plaster bandage, the cut edges of the negative cast separated and the positive cast removed. The positive cast is now ready for the molding of the splint.

THE MOLDING OF THE SPLINT ON THE POSITIVE CAST

As previously stated, to build the splint on the positive cast is not a difficult process and may be done equally well by the physician or nurse. The various articles required are as follows: stockinet or thin felt, gauze or book-muslin, solution of celluloid in acetone ("Gauvain's solution"—11 ounces of celluloid to 160 ounces of acetone, to which is added 3 ounces of calcium chlorid dissolved in 2 ounces of hot water, which should be added to the celluloid solution while still hot and well shaken), celluloid varnish (cellulose triacetate one part, acetone five parts), some leather for binding the splint and some boot-hooks.

METHOD

A layer of stockinet or felt is sewn over the positive cast. Over this is placed a layer of gauze or book-muslin, so cut as to conform to the shape of the cast. On this is painted a coat of the celluloid solution; another layer of gauze is applied, on which is painted another coat of celluloid solution; this process is repeated until from twelve to eighteen coats of celluloid solution are painted on as many layers of gauze, the number varying with the age of the patient and the character of the part to be splinted. Sufficient time should be allowed between the application of the successive coats of celluloid for the previous coat to dry. A few extra layers should be applied about the knee and ankle. After the final coat has dried a layer of celluloid varnish is applied. Two incisions are now made about $\frac{1}{2}$ inch apart and a strip of the splint removed at the point at which the opening is to be made. This permits of the removal of the positive cast from the interior of the splint. The splint is now ready to be fitted to the patient. It should fit perfectly, assuming that the cast was well made. It is usually necessary to cut away a small amount of the splint around the knee and ankle in order to facilitate its removal and reapplication.

After the fitting process is completed, the edges of the splint are bound with leather and boot-hooks are inserted. It is now ready for wear. The splint should be worn next to the skin as a stocking inside will force it out of place. It should be applied while the patient is still in bed, laced on and worn day and night, being removed twice a day for massage and passive movements. If it causes discomfort by undue pressure at any point, it should be stretched and manipulated so as to relieve the pressure. If relief cannot be obtained in this manner, some of the splint should be cut away rather than to put wool or leather inside the splint to relieve the pressure.

It is desirable that the patient be up and walking as soon as possible after the onset of the disease. Aided by the splints the average patient can walk at the end of the first month, without liability to deformity. A walking apparatus is usually necessary at first but many patients regain strength so rapidly that they are soon able to walk alone. A slipper or shoe should be fitted and worn over the splint, as walking is thereby made easier. Some patients with poliomyelitis recover so rapidly that the splints are no longer needed after a few months, while others may need to wear them even up to two years. If walking is not possible without support at the end of this time, a metal brace should be applied when the splints are discarded. In some cases of this disease there is never sufficient restoration to enable the patient to walk without some support. In those cases a metal brace will answer better after the splints have served their purpose.

CONCLUSIONS

Many patients with poliomyelitis are permanently disabled because of deformities. Celluloid splints prevent the deformities and aid in the recovery of the paralyzed muscles. They render the same aid in many other forms of paralysis and by affording support they give much comfort and greatly increase the efficiency of the patient with a Charcot joint and in extreme cases of hypotonia of tabes.

937 Rialto Building.

ANAPHYLAXIS FOLLOWING SKIN-GRAFTING FOR BURNS

H. L. UNDERWOOD, M.D.
LA GRANDE, ORE.

The case herewith reported is of interest, partly because perfect recovery followed, notwithstanding the extent of the burn and its systemic effects, and partly for the occurrence of certain phenomena analogous to if not identical with anaphylaxis. To quote Auer,¹ "While the investigator should be alert to note resemblances of reaction in the different species, he should be still more alert to discover new types of reaction." So far as I am aware there has been no effort to identify the reaction accompanying repeated skin-grafting over large areas with that of anaphylaxis, yet it seems clear that they are closely related if not identical, as the following case indicates:

History.—G. H., man, aged 25, driver, gave no evidence or history of constitutional disease of any kind. On the night of Nov. 14, 1910, he was burned by the explosion of a kerosene lamp. When seen by me shortly after the accident he was suffering acutely and presented burns from head to the knees with the charred night-clothes adherent to the flesh. The areas burned were: face, scorched but not blistered; neck, blistered and skin above right clavicle destroyed over an area of several square inches; right shoulder burned to third degree; right arm burned to third degree over two thirds its surface; right forearm burned to a blister; both hands badly blistered; all the right side and nearly half of the left side of the thorax burned badly, nearly all to third degree; about one-third of the entire back blistered, about one-third to the third degree; abdomen and groin on the right side burned to third degree, on left side, scorched; right hip blistered; right thigh, third degree burn over its inner aspect; external genitals completely blistered; left thigh, third degree burn over one-fourth inner surface; extensive areas burned to

1. Auer, J., in Forchheimer's *Therapeutics*, v.