interfere with the nutrition and development of any muscles that may have escaped complete paralysis. The stretching of weak muscles and the contracture of their stronger antagonists lead to progressive wasting of both, because a free range of movement is essential to the healthy circulation and growth of all muscles.

It is obvious that the actions of muscles must be imperfect when the joints and bones upon which they act have lost their natural mobility and shape.

It is of vital importance, therefore, to prevent contractures, and incidentally to avoid the need of operations whenever possible. A good deal can be done by:

1. Regular and vigorous stretching of the muscles, which tend to retract.
2. Developing their antagonists as far as possible by active and passive movements, massage, and electrical stimulation.
3. And lastly, by the use of suitable instruments, especially at night.

For instance, in this patient, contractures of the knees and hips could have been minimized by passive extension of these joints several times daily, by encouraging voluntary contraction of the extensors, and especially by the use of a double Thomas's hip splint at night. Then an apparatus, such as she now wears, could have been used in the day, without any need for a preliminary operation. In these ways the mobility of the knees and the normal stature could have been preserved.

It is interesting that the patient herself unconsciously prevented the development of talipes equinus by putting her weight upon her feet during her endeavours at progression.

OPERATION.

After carefully examining this patient and realizing the extreme severity of the contractures and the extent of the paralysis, I was inclined to advise against operation. But the patient, who had come all the way from Newcastle, was very anxious to have something done even at a considerable risk. Above all, her plucky endeavours to move about induced me to change my mind. The girl was so keen to help herself, that it seemed worth while to give her a sporting chance of learning to stand and walk with the aid of instruments. I did not dare hope that the result would be so good as it has already become in the short time that has elapsed since the operation. I have been greatly surprised to watch the development of so much power of moving the hip-joints. The most I expected was progression by rotary pelvic movements, but there is now no need of this ugly method, for the patient can flex the hips sufficiently to enable her to walk. These are some of the points which make me consider this patient a good subject for my clinical lecture.

Division of Contracted Tendons and Fasciae.

It was evident that these procedures would be insufficient to overcome the extreme contractures which had taken years to mature in this patient.

The vessels and nerves were also so greatly shortened that the simultaneous straightening of the hip and knee would throw an excessive strain upon these vital structures, which were unusually small in these withered limbs. The hips could have been first extended, and then the knee straightened after an interval of some weeks, during which the vessels and other structures behind the knees could be gradually stretched.

In this way slighter contractures of the knee and hip can be corrected without excising the knees and shortening the stature; but in my patient this method did not appear hopeful, on account of the degree and rigidity of the contractures and the withered condition of the limbs. Moreover, the bony and articular changes at the knees from long malposition and the total absence of muscular power made it certain that the knees could not be brought quite straight. In any case they would be flail.

The initial cost and ultimate expense of an instrument under these circumstances would be much greater, which is an important point for poor people.

Arthrodesis was unsuitable because the knees could not be extended without free removal of bone, and the union is not so likely to be firm as after excision. I therefore decided to undertake a more radical operation which could be completed at one sitting. I have generally dissected away the shortened fasciae for severe contractures of the

hip to lessen the risk of recurrence, but in this patient, in order to save time, I was content with subcutaneous but very free division. Recurrence of the contracture can be prevented by passive movements and instruments. When the hip was fully extended the tension of the hamstring was somewhat relieved, so that the flexion of the knee was diminished to some extent. Tenotomies, however, made but little difference, and a very free excision of bone was necessary.

Instruments.

The day instrument and a posterior night splint preventing bending of the knee at the union and at the epiphyseal lines.

The apparatus shown in the photograph (Fig. 4) is provided with toe-lifting springs and T valgus straps. There are no joints at the knees, which are kept firmly fixed by straps. The side-irons take some of the weight off the legs, and the whole apparatus, including the pelvic girdle, adds to the stability of the body.

For making the instruments I am much indebted to Mr. Pengelley, of Catherine Street, Strand. My best thanks are also due to Mr. Perkins, my late House-Surgeon, and to my dressers, for their help during the operation and after-treatment.

THE NERVE SHEATH IN THE CAUSATION AND TREATMENT OF NEURALGIA.

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THE influence of pressure as the cause of neuralgia, especially in the case of the branches of the brachial and sciatic nerves, is so abundantly recognized, that it seems unnecessary to labour or illustrate the point. It is not, however, sufficiently recognized that this pressure upon the sensory elements of the nerves may arise, not only from causes entirely outside the nerve bundles, but also from changes in the perineurium, that is, the nerve sheath.

These changes may be due, firstly, to an extension of inflammation from surrounding tissues, as in the cases of brachial neuralgia, in which one can frequently, in my experience generally, elicit a history of bruising of the muscles or fibrous tissues surrounding the nerves; secondly, to such toxic conditions of the blood as have a tendency to cause proliferation of the connective tissue in the immediate neighbourhood of blood vessels, for example, chronic alcoholism; and thirdly, to acute congestions of blood vessels in the sheath of the nerves. This form of neuralgia is apt to occur in influenza, or as an after effect.

Morphologically, there is, I am told, no such thing as a nerve sheath—that is, no separate structure which can be clearly defined and exhibited; but, while this is no doubt true, and nerve elements cannot be found lying loose in a nerve sheath as a nut in its shell, it is true enough for all practical purposes that there is a distinct nerve sheath. The connective tissue which forms a nerve sheath is continuous externally with the connective tissue outside it, and from its inner surface fine trabeculae of connective tissue extend to form a protective covering between and round the myelin and axis cylinders of the nerve elements. Blood vessels are carried in all these connective tissue structures, and it is, I believe, upon the congestion of these vessels that the occurrence of pain depends. There is no lymph space between the sheath and the nerve elements proper, and for this reason any material overfullness of the vessels of the sheath, or a very slight oedema around them, or exudation into the lymph spaces in the interstices of the sheath will of necessity cause an amount of pain altogether out of proportion to the pain which would be caused by an equal or vastly greater effusion outside and round the nerve sheath itself.

If this theory of the cause of pain is correct, the failure of many methods of treatment in some cases of sciatica and brachial neuralgia will be explained and the reason for the success of other methods rendered probable.

To some of these methods I will revert later, but will now give details of two cases that seem to illustrate the truth of the proposition that it is often the condition of

things inside and not outside the nerve sheath that is the cause of pain.

CASE I.

J. W. O., a miner, aged 32, was admitted to the General Hospital in Birmingham under my care on February 29th, 1908, complaining of sciatica.

In March, 1907, he had a good deal of pain in the left buttock; this gradually got worse and extended down the leg. It soon became so severe that he had to give up work, and, failing relief from medicinal treatment, he went to Droitwich to try brine baths. He improved somewhat, but soon got as bad as ever, and in February when he was admitted to hospital was unable to walk on account of the pain. I am sorry to say I wasted a month of his life in trying to relieve him with drugs and local applications.

As he was unrelieved I asked my colleague, Mr. Barling, to cut down upon the sciatic and open the nerve sheath. This was done on April 1st, and numerous tough red adhesions between the sheath and the nerve were found. These were broken down and the nerve stretched *inside* the sheath.

Next day he was fairly comfortable, except for some pain due to the incision.

Three days after the operation it was noted that all pain had gone, and that the patient had not enjoyed so long a freedom from pain for months.

Ten days later he was discharged, free from pain, and able to walk with perfect comfort. He has remained quite well since.

CASE II.

A gentleman, aged 65, recovered very slowly from a severe attack of influenza.

During his convalescence I was asked to see him again on account of intolerable pain down the arm, and especially in the distribution of the musculo-spiral nerve. This pain was most marked about the middle of the upper arm, where the nerve is most superficial, and was associated with exquisite tenderness. No drug treatment made the slightest difference to him, except large doses of antifebrin, which gave him moderate, if transitory, relief. Radiant heat gave more freedom from pain than anything else. Leeches, blisters, and all sorts of local applications were tried, but ineffectually.

Very slowly and gradually the pain lessened, but never entirely left him, until one day it suddenly became worse than ever, and the temperature, which had been normal, began to vary from 99° to 100.5°. I told him that there was probably inflammation inside the nerve sheath, and urged operation, thinking that there might be adhesions also between the nerve and the periosteum.

He would not entertain the idea, but after a week of misery consented to anything being done.

Mr. Barling cut down on the musculo-spiral nerve at the point of maximum pain, and found it adherent to the periosteum. The adhesions were broken down and the nerve sheath opened.

The same treatment as in the case of sciatica was adopted. Immediate relief from pain followed, and tenderness gradually disappeared.

It seemed certain that no other treatment would have been so immediately useful in either of these two cases; indeed, no other treatment had done more than give temporary relief.

Nerve stretching, from which so much was expected in the treatment of severe long-standing cases of neuralgia, has been abandoned on account of the disappointing results; and, indeed, it is not easy to imagine how any amount of pulling a nerve could influence the inflammatory condition of the inside of the sheath.

It is in the hope that this method of treatment may be criticized that this paper is being published. Of the success of the procedure there can, I think, be no doubt, so far as the relief of pain is concerned. I would only urge that it should be adopted before trophic changes occur, as Dr. Fleming, of Edinburgh, and others have pointed out that, even if a nerve is healthy to begin with, continued pressure will ultimately end in disorganization of the axis cylinder and the production of trophic troubles.

In the *Practitioner* of 1886 the late Sir Joseph Fayrer published a case in which what was believed to be a swelling of the nerve sheath was opened and about a couple of drachms of clear fluid evacuated, with immediate relief to the severe sciatic pain which had been complained of. I have had an equally good result in a case of severe neuralgia of the ulnar nerve in which a similar course was adopted.

Many instances of the cure of sciatica by acupuncture have been recorded, due doubtless to the setting free of fluid accumulated between the nerve sheath and the myelin of the nerve; but though this method may be, and often is, successful, it cannot compare, any more than can the procedure adopted by Sir Joseph Fayrer, with the more thorough operation of cutting down on and opening the nerve sheath and the separation of internal adhesions.

AURAL VERTIGO.*

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SINCE Ménière's description in 1861 of a case of the disease with which his name has been since associated, this title has been extended to include a variety of cases bearing more or less resemblance clinically to that properly called Ménière's disease. Yet, viewed from the pathological standpoint, the great majority of these have no right to be thus included, and, on the other hand, there are other cases in which similar changes have taken place in the ear, and which, nevertheless, have been considered quite distinct and unassociated with aural disease. Some authors have attempted a compromise by limiting the name to the rare variety first described and grouping the others under the title "vertigo with aural lesions and Ménière's symptoms," obviously a makeshift, but probably as good as was possible owing to the limited knowledge of the actual pathological changes in the ear, and especially in the labyrinth.

DEFINITION.

The result of the researches of many observers, both in this and other countries, during the past few years on the changes in the middle and internal ears consequent on disease, suggests the advisability of a thorough overhauling of our terminology. Indeed, the application of the name of any man, however distinguished, to a disease cannot be regarded as scientific, and is, in fact, likely to hamper the study of its details. There is no doubt that this has been the case with reference to the subject of this communication. In aural disease, as in disease of other parts, the only scientific nomenclature is that based on pathological findings, and in this way only can cases be relegated to their proper category. So that, as Lermoyez remarks, the time has come when the name "Ménière's disease" should be abandoned and our nosology revised in the light of the conditions found *post mortem*. For the present, however, we may retain the title to denote the condition actually described by the original observer.

As a matter of fact this is a very rare disease, an observation which, I have no doubt, will occasion surprise in view of the frequency with which the name is used. The case described by Ménière before the French Academy of Medicine was that of a young woman who during her menstrual period was suddenly and without evident cause affected with deafness, accompanied by vomiting and severe vertigo. Five days later she died, and on *post-mortem* examination the only lesion found was hæmorrhage into the semicircular canals, and to a less extent into the vestibule, while the cochlea was not affected. (It may be remarked here that a fatal issue to Ménière's disease is unusual.) Cases presenting the same clinical symptoms had previously been reported, but they were considered to be due to hepatic, stomachic, renal, cerebral, cerebellar, or other cause, and their connexion with an aural lesion was not suspected. From this case Ménière concluded that these previously reported cases, and others resembling them in showing the symptoms of sudden deafness, loud subjective noises, severe vertigo—the three cardinal symptoms as they have been called—taken in connexion with the well-known results of experiments on animals, were due to hæmorrhage or acute inflammatory exudation into the semicircular canals. Unfortunately, as I have said, the generic term "Ménière's disease" has been used to include all cases in which these symptoms have presented themselves, in whatever degree and in whatever manner of appearance. Hence the confusion of thought which has arisen. We may, however, use the parent disease as a guide to describe the various aural conditions which give rise to vertigo.

ANATOMY AND PHYSIOLOGY.

Let me rehearse in little detail the anatomy and physiology of the internal ear, for it will aid us in understanding the phenomenon under consideration. It must be looked upon as a double organ, dealing both, and to a certain extent separately, with the sense of hearing and with the sense of position in space—the static or, better, the spatial sense.

* Read before the Border Counties Branch of the British Medical Association.