The tremor of paralysis agitans is to be differentiated especially from that of senility, of alcoholism and other forms of intoxication, from the incoördinated movements of multiple cerebrospinal sclerosis and from hysterical tremor. Senile tremor, however, rarely, if ever, begins in one member or on one side, but generally is distributed uniformly. It is usually fine and frequent, slight or absent during rest, is increased by violent effort, is not associated with rigidity, occurs later in life, and is not progressive in course. The various forms of toxic tremor, likewise, are fine, frequent, general, slight or absent during rest, increased on voluntary action, and unassociated with rigidity. They may, of course, occur at any time of life, although more common during active adult existence, and in conjunction with other more or less distinctive symptoms. A history of exposure to the exciting influence is of decisive importance in the diagnosis. The movements of multiple sclerosis are coarse and somewhat unlike ordinary tremor, being rather incoördinate and wanting in rhythm. They are also generally absent during rest and are induced only by voluntary effort, and are often associated with lesions of the fundus of the eye, with nystagmus, scanning speech and derangement of micturition, while rigidity is not likely to be present and the peculiar facies of paralysis agitans is wanting. The tremor of paralysis agitans is to be differentiated from that of hysteria by the association with the latter especially of other hysterical stigmata and by the influence of suggestion.

Paralysis agitans without tremor is not so common that the report of two cases recently under observation in which tremor was the least conspicuous of the symptoms may not be without interest. Both patients were seen at the Orthopedic Hospital and Infirmary for Nervous Diseases, the one in the service of Dr. S. Weir Mitchell and the other in that of Dr. Wharton Sinkler, to both of whom I am indebted for the privilege of making this report.

S. S., a plumber 50 years old, presented himself for what he designated nervousness. He suffered from mental confusion, with depression and introspection. There was also weakness of the legs, more marked on the left. For several years there had been stiffness, which began with a cramp-like feeling in the left foot, and extended to the shoulder and elsewhere. Slight tremor was noted and this the patient stated occasionally became quite marked, although at times it was scarcely, if at all, appreciable. The patient presented the typical appearance and facies of a case of paralysis agitans. The face was fixed and immobile, the attitude was stooped forward, the speech was slow, the voice low and monotonous, and all movements and apparently also cerebation appeared slow. The knee-jerks were small and station was steady. The pupils were full, equal, regular, reactive to light. The grasp was firm, the dynamometric register being 170 on the right and 130 on the left. There was some tendency to propulsion. The action of the heart was rhythmic and the sounds clear. The radial artery was stiff and the tension plus. Memory was impaired; sleep was poor; the bowels were constipated. The patient was easily chilled and suffered readily from cold, and under such circumstances the hands became cyanotic. The urine presented no abnormality. The man once had gonorrhea, but there was no evidence of syphilis. He had used alcohol, tobacco, coffee and tea only in moderation. He had suffered business reverses and one of his daughters was neurasthenic from overstudy.

J. H., a woman 68 years old, presented herself on account of weakness in the lower extremities and in the back, with difficulty in walking. There was slight tremor in the right hand on voluntary movement. The countenance was rather fixed. Speech was slow and the gait decrepit. The knee-jerks were

slightly exaggerated, but there was no ankle-clonus. On inspection it was found that both hands were tremulous when held out, but not when in action or at rest. The tremor was said to be more marked on some days than on others. Station was unsteady, the patient yielding toward the right, as she did also in walking. In attempting to walk there was some delay in starting out, and all movements were performed slowly. The action of the heart was rhythmic, the first sound clear, the second greatly exaggerated. The pulse, though not strong, was of increased tension. The pupils reacted to light. The patient suffered from no sense of undue heat, and from no excessive sweating. An additionally interesting feature of this case is the fact that a daughter 47 years old, who merely accompanied her mother and did not seek treatment, presented a distinctly cretinoid appearance. She had not learned to walk until the age of 3, although she spoke clearly and subsequently did well at school. Menstruation had not begun until the age of 22. The patient was short of stature, measuring only 4 feet 6 1/2 inches in height. The thyroid gland, especially the right and middle lobes, was found enlarged, and is said to have been so for seven or eight years. The complexion was pale and muddy, and the skin wrinkled; but there was no thickening of the subdermal tissues. The tongue was rather large and rough, and intelligence appeared deficient. There was no tachycardia and the eyes were not prominent. The knee-jerks were active, but there was no ankle-clonus.

While it can not be strictly said that in the two cases of paralysis agitans which I have reported the tremor was wholly absent, it was at times so inconspicuous as not to be viewed as a symptom of importance, much less of diagnostic utility. The main object of this communication is to invoke renewed attention to the fact that the disorder under consideration may be unattended with tremor, and further that this, when present, may be accentuated by voluntary action.

NEW METHODS FOR THE APPLICATION OF OLD PRINCIPLES IN THE TREATMENT OF FRACTURES AND DEFORMITIES OF LIMBS.

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In all cases of fracture, to restore and maintain the limb in its normal position, extension and counter-extension between bony prominences, or a flexed segment of the limb, above and below the fracture, must be employed.¹ To this must be added immobilization, when normal position of the limb is accurately secured. In addition to the above principles, the open dressing, in compound fractures, is of primary importance for obvious reasons. Every splint should permit of inspection, bathing, ventilation, etc. There should be no circular constriction of the limb to retard the circulation. The effects of impaired circulation, delayed union, ischemia, stiff joints, and in some cases non-union, can be ascribed to this interference.

It is safe to say that fully one-half the fractures of the leg should be treated by the ambulatory method. Many patients assume the erect position in spite of the warnings of their medical attendant. The patient suffering from a fracture of the leg, or thigh, is asked to assume the recumbent position until nature repairs the solution. The principles governing the treatment of fractures are the same in the erect as in the recumbent position, and can be applied in one case as well as in another, and if these principles are fulfilled, displacement can not occur in either position.

With a view of embodying the above principles in

1. American Text-Book of Surgery, 1893, p. 287.

the treatment of fractures of the arm, and of fractures, deformities and diseases of the leg and hip-joint, the writer has constructed splints for the upper and lower extremities, each embodying the same general principles, so that a description of any one will suffice. The splints consist of inflatable cushions, in combination with adjustable stays, arranged in such a manner that there is no solid contact any where on the limb.

Each part of the splint is simply and easily adjusted. The cushions prevent any injury from pressure, and over the ankle they are arranged vertically with interspaces to permit of free circulation while securing extension. The leg or immobilizing cushions may be segmented if desired, but as the bones are not so superficial as at the ankle, and as there is no traction on the

In the ambulatory treatment, when the weight is placed on the foot-plate, it is received by the pelvis, the leg being in a "sling," suspended from the pelvis. A cane should always be carried, but where desired, a crutch may be substituted.

The shoe of the opposite foot should be raised, to match the raised foot. The erect position, with a limited amount of exercise, will tend to preserve the general health, increase the circulation, hasten absorption, and promote growth and repair, this, with the accuracy of adjustment which preceded it, and can be secured by this method, limits the amount of softening and absorption, hastens the time of healing, and avoids the usual muscular atrophy which accompanies fractures owing

Pneumatic splint with belt suspender attachment for walking.

cushions, this is not necessary. The hip-cushion grasps the thigh at the angle of the pelvis, and is arranged so that it can be made to follow the angle of the right or left thigh, as desired. The sock grasps the leg at the ankle, with interspaces between its vertical cushions. By means of the adjustable stays, extension and counter-extension is made between these points with turn-screws and key. With solid metallic connection between these cushions, the degree of separation on which the adjustment depends remains the same, no matter what position is assumed.

Shortening is prevented in fractures of the leg and thigh. Immobilization is secured by the aid of the leg-cushions, and clips connecting the stays, and is under full control, deformity being prevented, as well as shortening. When the splint is applied, the foot does not come into contact with the foot-plate.

Pneumatic splint with immobilizing hip-joint attachment for walking, the adjustable belt not shown in illustration.

to disuse of limbs and circular constriction.

Bandaging to assist in retaining the fragments in apposition should pass from the leg or arm to the stays, for better support and to avoid circular constriction.

The suspender attachment supports the weight of the splint, from the body, and is adjustable.

The accurate coaptation secured by this method reduces pain, lessens the amount of softening and absorption, and hastens convalescence. By avoiding circular constriction, we limit the amount of exudation, facilitate growth, repair, and absorption; avoid ischemia and stiff joints.

Is circular compression adequate to maintain the apposition of the fragments? Experience in fractures of the upper third of the femur has shown that circular compression, no matter how applied, can not by itself maintain apposition. What is true in the upper third

is also true, in a lesser degree, in other places. The beneficial effects of circular constriction with bandage and cast, has been over-estimated, while its dangers and disadvantages have been too little commented on, if they have been fully appreciated. Open dressings facilitate inspection, dressing, bathing, ventilation, massage, and any indicated treatment, the importance of which needs no emphasis. The attachment for immobilizing the hip-joint is applied in fractures of the neck of the femur, and also used in hip-joint diseases, and is on the same principle as that now in vogue. When the key is removed and the caps replaced, the splint is locked, and the adjustment can not be interfered with. The pneumatic pads are covered with satin-finished waterproof leather, and can be cleaned with warm water and soap when necessary.

The splints are easily worn under the regular clothing, and are so well constructed that they will last practically a life time.

They have been tested by the writer in some severe cases, with perfect results; among them, one case of compound, comminuted, multiple fracture of both legs. The bones in the right leg penetrated the skin in five different places, and in the left leg, in three. Several loose fragments of bone had to be removed. The usual dressings were tried, but had to be abandoned on account of the excruciating pain and stasis. Amputation of both legs was considered necessary by attending physicians, but the patient would not submit to it, and further counsel was called, resulting in the application of pneumatic splints to both legs. The pain ceased at once, on application. The absence of circular constriction allowed complete restoration of the circulation, and permitted of proper open dressings for the wounds. The splints were only worn thirty-three days; ankle and knee motion was in no way impaired; the union and result was perfect.

I mention another case, on account of the attending circumstances, one of simple fracture of the tibia. The patient was erecting a house at the time, and hauled lumber seven miles daily, without discomfort and with perfect result.

Before bringing the appliances to the notice of the profession, they were submitted to some of our most eminent surgeons, whose unqualified endorsement has demonstrated the unparalleled excellence of the treatment.

POSSIBILITIES OF LIQUID AIR TO THE PHYSICIAN.*

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It is now over a year since I began the use of liquid air in the hospitals of New York, and less than a year since I published in the *Medical Record* a preliminary report of the results obtained by its use up to that time; and I am led to-day to accept your invitation to present this subject to your Section, no less by the pleasant recollections of the last time I appeared before you, than by the many communications I have received since publishing my report, from all parts of the world, demonstrating the lack of knowledge of the public as well as physicians as to what liquid air really is. I have received requests from physicians from nearly all parts of the United States, from Mexico, from Germany and even from New

Zealand, asking that a small package be sent and all expense would be paid at the other end. I have been asked whether it were given hypodermatically, and whether it would not be good taken in small doses internally for abscess of the liver. One physician, who has represented many drug houses, wanted to know if it could not be put up in small packages and retailed at the drug stores and whether he could not act as my Southern agent. Nearly all physicians say, in discussing the subject, "Oh, we have tried extreme cold before and know it is no good." Possibly there are some of you here this afternoon who have never seen liquid air, and if so, I shall demonstrate that you really never knew what cold was before. I intend at least to show you what liquid air really is, and have brought with me, through the courtesy of the Tripler Liquid Air Company, a generous supply in order that I may show you its physical properties and demonstrate some of its applications, as well as show you some of the appliances which more directly concern us.

After doing this, I desire to briefly tell you of some of the things we have accomplished with it at the Vanderbilt clinic of Columbia University, and elsewhere; and then call attention to some of the things which may be done in the treatment of internal diseases. [Dr. White gave several demonstrations with liquid air.]

In my former paper I told of the results of our attempt to kill germs with liquid air. With Dr. William H. Parks, we tested the effects of liquid air on typhoid, anthrax and diphtheria bacilli. In order first to test the effect of extreme cold on these germs without bringing them in direct contact with the liquid, we put into a number of capillary tubes pure cultures of virulent anthrax, diphtheria and typhoid bacilli. These capillary tubes were marked for identification, sealed at both ends, and dropped into a glass of liquid air. The liquid was renewed at intervals, so that the tubes were at all times completely submerged. Some were removed in thirty minutes, others in forty-five minutes, sixty minutes, and ninety minutes. After they were removed from the liquid and the sealed ends were broken, they were dropped into separate culture-tubes containing fresh sterilized bouillon, and these in turn marked for identification. These bouillon tubes were placed in incubators kept at a temperature of 38 C., where they remained for over forty-eight hours, when they were all examined and found to contain pure cultures of anthrax, typhoid and diphtheria bacilli according as they had been inoculated. In order to test whether liquid air itself in addition to its temperature would have any effect on germ life, a culture-medium containing numerous colonies of anthrax bacilli was dropped into a glass of liquid air and allowed to remain over an hour. When removed, a fresh sterile culture-medium was inoculated with the one exposed to liquid air and placed in the incubator as before. The same result was obtained as when the capillary tubes were exposed.

Dr. J. H. Huddleston tried the effect of liquid air on vaccinia virus, and found that fifteen minutes' or less exposure to the liquid air had no effect whatever on the power of the virus to produce vaccination.

Longer exposures to liquid air have been tried with the same result. Dr. Park has recently made further experiments, making the exposure over two hours and exposing all kinds of germ life in form of pure virulent cultures, from hay infusion to anthrax bacilli. With this exposure, taken all together, from the weakest germs to the strongest, it kills from 98 to 50 per cent. Of the typhoid germ it kills about 75 per cent. in two

* Presented to the Section on Diseases of Children, at the Fifty-first Annual Meeting of the American Medical Association, held at Atlantic City, N. J., June 5-8, 1900.