

The more accurate examination of these parts is greatly assisted by using a lens, such as is generally sold with the ophthalmoscope, and holding it a short distance before the patient's eye, this being regulated by the focus of the glass, and getting the adjustment.

In a future report we shall detail cases with practical remarks.

Original Communications.

ON DISEASES OF JOINTS.

By HOLMES COOTE, Esq., F.R.S.C., Assistant-Surgeon to St. Bartholomew's Hospital, and to the Royal Orthopædic Hospital, etc.

VI. THE ANKLE-JOINT.

[Continued from page 430.]

SPRAINS. A joint is said to be sprained when the ligaments are either much stretched or violently twisted, there being no displacement of the osseous surfaces. The treatment usually recommended consists in rubbing the parts with a stimulating embrocation; applying cold lotion, or leeches; in the enforcement of rest; and subsequently, in giving the support of a bandage. We may perhaps dismiss the consideration of the accident in these few words, when the patient is a hale, well made person, whom some accidental violence has befallen. But it is otherwise with a very large number of cases, in which the sprain is an indication of some pre-existent fault of conformation, and but the prelude of serious disease.

Let us first inquire how it happens that sprained ankles are so common in growing girls or weakly lads; for the success of treatment must depend upon the removal of a predisposing cause. A large number of such persons are subject to knock-knee (*genu valgum*); to bow-legs (*genu extorsum*), either with or without the complication of rickets; to curvatures of the tibia and fibula: in short, to a variety of deformities which throw the weight of the body from the proper line bearing upon the astragalus and the elastic calcaneo-scapoid ligament. It follows that, at the ankle-joint, one ligament (generally the internal lateral) has to sustain a more constant and greater pressure than that usually assigned to it; it yields, and permits a corresponding deviation of the bones; the line of action of muscles and tendons becomes altered: hence, with a predisposition on the part of the ligament to stretch, there is an absence of that strength and general solidity which the proper apposition of the osseous surfaces ensures.

There exists a similar condition of the ligaments of the knee-joint, due in many cases to deformity of the femur. In the summer of 1857, a lady met with a fall, and hurt her knee. She was seen by her usual medical attendant, as well as by another surgeon, both of whom noticed an undue prominence of the head of the fibula; and, in the belief that the ligaments connecting this bone with the tibia had yielded, bandages were applied round the limb. I am unable to offer an opinion upon this case; but the circumstances which had been mentioned to me recurred to my mind when I saw the following.

Miss —, aged 23, of short stature, but healthy looking, of excitable temperament and somewhat indolent habits, applied to me, March 1858, in consequence of a painful condition of the left knee, consequent upon over-exertion. Upon examination, the first point which struck me was an undue prominence of the head of the fibula. Further investigation showed anterior and outward curvature of the femur and curvature of the tibia, great yielding and lengthening of the external lateral ligament of the knee, and increased lateral mobility of the joint, attended with great weakness of the limb. This patient in early life had suffered from rickets; the outward curve of the bones of the lower extremity had thrown the head of the fibula outwards also; the ligament connecting the upper extremity of this bone with the tibia, possibly weakened and elongated, yielded more readily than usual to any strain: hence an accident, which would have been unnoticed in a well formed person, was here followed by unpleasant consequences.

The treatment consisted in rectifying the general deformity as far as possible. An inside splint was first applied to correct the outward bend of the leg; then inside irons, with a moveable

joint at the knee, were attached to the boot; straps were applied round the knee; and, as the knees regained their normal relations, the projection of the fibula, as well as the sensation of weakness, gradually disappeared.

In the ankle-joint, sprains lead to singular morbid changes. In 1844, a young lady greatly fatigued herself by taking a very long walk, the distance intended having been greatly exceeded by accidental circumstances. She kept her room for a day or two, and, upon resuming her usual habits, found the right foot and ankle painful, and liable to swelling upon the least exertion. In 1847, the swelling became permanent, and she was unable to put the foot to the ground. There was no pain so long as she kept perfectly quiet, but the least movement caused uneasiness. She was under the care successively of many surgeons, by whom nearly every possible plan of treatment was adopted, and with occasional temporary benefit. But the swelling, which was chiefly between the tendo Achillis and the os calcis (the joint being perfect), increased, and the skin ulcerated. In 1849, the limb was amputated. Examination of the part showed that there was no disease of malignant character, as on several occasions supposed; but that the synovial theca of the flexor tendons had undergone a change somewhat similar to what is witnessed in the theca of the flexors of the fingers; namely, thickening from chronic inflammation with effusion of serum mixed with blood; division of the theca into pouches of different sizes, of which some had made their way through the skin. This lady has since married, and is now in perfect health, and the mother of healthy children.

In the month of May of the present year, Mr. Lawrence removed the leg of a young Irishman, in whom the foot and heel became so swelled and painful that he was obliged to walk about on crutches. I had the opportunity of examining the limb, and found that the primary disease was neuroma of the posterior tibial nerve, as it lay behind the inner malleolus. The nerve-fibrils were spread out into a tumour about the size of the last joint of a man's thumb, several smaller tumours being in the neighbouring branches. Below the tumour, the sole of the foot, in its centre breadth and depth, had undergone the following changes: it was greatly swelled and infiltrated by serous effusion; the muscular fibres had every where undergone fatty degeneration, being reduced to a yellowish white pulpy material; all parts were more or less blended, except the tendons, which lay bright and shining in this amorphous substance. I have no hesitation in saying that the disease of the nerve had interfered with the healthy nutrition of the foot, and that a low form of inflammation had led to this universal degeneration of the normal tissues.

I have seen a case of neuroma of the sole of the foot, possessing the characters of a "pulsating tumour".

INCONTINENCE OF URINE TREATED BY THE LOCAL APPLICATION OF CARBONIC ACID GAS WITH CHLOROFORM.

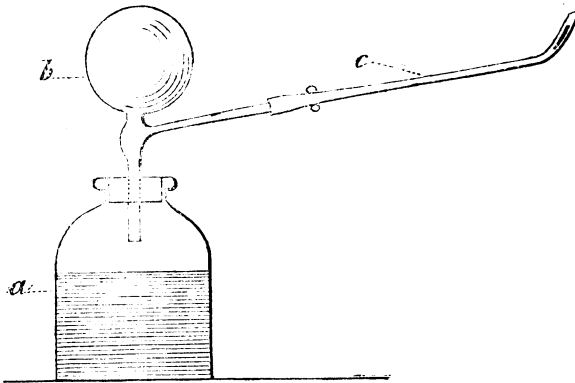
By JAMES RHODES, Esq., Glossop.

My attention has been directed to the use of carbonic acid gas by the remarks of Dr. Simpson in 1856, and now I have used carbonic acid combined with chloroform since the insertion of the subject in the BRITISH MEDICAL JOURNAL in April 1858, as the mode of applying the gas may be useful in the same class of cases, and I think the quantity of gas to be used can be very easily regulated; and thus the double catheter, recommended by Dr. Simpson, may be dispensed with.

CASE. J. H., aged 78, had been troubled with incontinence of urine in the night for seven months. I tried various means; and, as he was very anxious for relief, I used carbonic acid and chloroform for the first time on May 12th. After the first application, the effect was marked by almost total cessation of symptoms. It was again used in four days, with still greater improvement. Two nights afterwards, he had a slight return of the symptoms; and again on the night after (19th) I again used the gas and chloroform; and ever since then, now more than a month, he has not had any recurrence of his complaint.

I beg to submit this sketch, as being, to the best of my knowledge, the first case of incontinence of urine in a man treated with this gas with a result so rapidly successful.

Subjoined is a representation of the apparatus used by me.



In the figure, *a* is a bottle containing a mixture of prepared chalk with dilute sulphuric acid, and twenty or thirty minims of chloroform. When the bottle is charged, the nozzle of an elastic ear-syringe (*b*) is introduced through a perforated cork which fits the bottle; and to the elastic tube of the syringe is fitted a catheter (*c*). Before adapting the latter, the syringe should be exhausted two or three times.

Abstract of Lectures

ON THE

PHYSIOLOGY OF THE NERVOUS SYSTEM.

DELIVERED AT THE

ROYAL COLLEGE OF SURGEONS.

By E. BROWN-SEQUARD, M.D.

[From Notes by ALEXANDER HENRY, M.D.]

LECTURE V.

Two or three years ago, there was a case observed in Paris, which for a time greatly puzzled physiologists. A patient had complete loss both of sensation and of voluntary motion in the right half of the face; most of the special senses were also lost, especially sight and hearing. There was ulceration of the centre of the cornea, and the globe of the right eye was inflamed. The face was drawn to the opposite side. On the left side of the body, there was complete insensibility to pain, to touch, to heat, to cold, etc.; the muscular contractions produced by galvanism were not painful. There was also complete paralysis of voluntary motion on the same side of the body; and here also, it was specially observed, there was a notable diminution of temperature. On the other side, the opposite conditions prevailed, as may be thus represented—

Left side of body.

Paralysis of motion.
Anæsthesia.
Diminished temperature.

Right side of body.

Voluntary motion retained.
Hyperæsthesia.
Increased temperature.

The above case, though considered remarkable, is only an instance in which there is nothing surprising. The phenomena observed were just what ought to be presented in all cases of rapid alteration of one half of the pons Varolii; and in this case there was a scrofulous tumour destroying the pons on the right side. In cases of injury of the pons, the trigeminal nerve at times suffers; sometimes by pressure on the outer part, and sometimes by injury of the roots; and this produces the peculiar morbid changes in the eye. Snellen, a pupil of Donders, has found out, (and the lecturer has repeated the experiments), that when the trigeminal nerve is divided, if the eye is left unsheltered, disease takes place; but if light be excluded by covering the eye, by which also evaporation from the surface of the conjunctiva and cornea is prevented, then the eye undergoes no alteration. This fact has been observed also by Bowman.

Causes of the Alterations in the Temperature of the Affected Parts. In cases of the kind which has been related, the loss of temperature arises from a permanent contraction of the

blood-vessels. The observation of the influence of the nerves on the blood-vessels has been a great step in the progress of medicine. It is due in part to Henle, Stilling, Valentin, etc.; but the views of these physiologists, when first published, were not altogether proved. They asserted that the blood-vessels were under the control of the nervous system; and that when the nerves were paralysed, the blood-vessels were also paralysed. But the complete discovery of the circumstances connected with the subject was not made until Bernard found that, after section of the sympathetic nerve, there is an increase of temperature and of sensibility. He also noticed some additional facts, which had, however, been previously pointed out by John Reid and others.

When the lecturer first investigated this subject, he believed that the sympathetic nerve alone was the motor nerve of the blood-vessels; and that, if it were divided, there should be paralysis of the vessels, so that they would become dilated, and more blood would flow through the part. This is precisely what is observed to occur; and the increased flow of blood produces an increase of heat, as well as an increased activity in the nutritive changes and in the vital properties of the part.

It was further necessary to examine into the effects of galvanising the sympathetic nerve instead of dividing it. It was found that, by galvanism, the blood-vessels could be sometimes made to contract so completely as to prevent all circulation through the vessels. This spasm may last even during ten minutes; but usually it cannot continue long, no matter how powerful the excitation has been. This fact was ascertained by Professor Bernard subsequently to, but independently of the lecturer.

If all the results be collated, we find a series of most important phenomena, arising from section of the sympathetic; viz., 1, paralysis of blood-vessels; 2, as a secondary effect, local increase of temperature; 3, increase of the vital properties of parts. Besides the dilatation of the vessels, there is increased sensibility; and the muscles of the face are in a much more tonic state than usual. If the animal is killed, the muscular irritability lasts much longer; the motor nerves are more irritable, and reflex phenomena can be excited for a longer time. All the secretions also continue for a longer time. After section of the sympathetic in the neck of a rabbit, on the left side for instance, the blood-vessels in the left ear will be observed to be enlarged, and more filled with blood, while the heat of the ear is notably augmented.

Galvanism of the sympathetic nerve produces the contrary phenomena. Muscular irritability and the excitability of the motor nerves disappear sooner in the side which has been operated on; and the temperature diminishes more rapidly.

Another remarkable phenomenon, which was first pointed out by Pourfour du Petit, shews that the sympathetic is the nerve principally concerned in dilatation of the pupil. Section of the sympathetic nerve in the neck produces paralysis of the dilating fibres, and contraction of the pupil is the result; in the same way as when the flexor muscles of the arm are paralysed, and the extensors draw the limb backwards. When the sympathetic nerve is galvanised, the pupil is dilated.

But the sympathetic is not the only motor nerve of the blood-vessels; and, after all, this nerve is but an offset of the cerebro-spinal system. Similar effects to those which may be produced by injury of the sympathetic, follow division of one half of the spinal cord, with slight exceptions as to the parts affected, and as to the paralysis of voluntary motion, which occurs in the latter case. If the foot of an animal in which one half of the cord has been divided be examined, there will be found to be increased vascularity; the reflex action and muscular irritability also last longer than in the opposite limb. Cadaveric rigidity sets in later, both after section of the sympathetic and after division of the cord; and putrefactive changes are more tardy in appearing on the injured side.

These facts show, first, the origin of the nerves of the blood-vessels from the spinal cord; and secondly, the influence of paralysis of the blood-vessels on the vital properties of the parts.

Influence of Irritation of Sensitive Nerves of One Part on the Blood vessels of Distant Parts. It has been observed that, if one hand be dipped into water nearly at the temperature of freezing point, the other hand will soon lose a good deal of its heat. Dr. W. F. Edwards, who first observed this phenomenon, thought that the temperature of all the parts of the frame was in like manner affected; but this opinion is not supported by observation. Many speculations have been made on this phenomenon, especially in regard to its practical utility, by Mr.