ative results might be judged. In the second hundred cases, the London example was followed, and the deaths after completed and incomplete operations were separated; but details were given of every case of incomplete operation. Now, the practice seems to be to ignore altogether incomplete operations, exploratory incisions, or errors of diagnosis.

My confidence in the cautery in the treatment of the pedicle was some time ago shaken by hearing of a death from hæmorrhage the day after operation in a case where it was employed. In four-fifths of the cases in this series the clamp was used, the cautery being reserved for very short pedicles. Of late, my faith in the cautery has returned, and I have used it in some ordinary operations. The last twenty-one operations were performed under the carbolic acid spray.

Sulphuric ether has now been given in two hundred operations. Properly administered, it is nearly a perfect anæsthetic. I have pleasure in acknowledging the value of Mr. Ormsby's simple inhaler.

JABORANDI PROPOSED AS A REMEDY IN HYDROPHOBIA, FROM OBSERVATIONS IN TWO CASES OF THE DISEASE IN MAN.

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THE attention both of the public and of the profession is at present so much taken up with the subject of hydrophobia, that I have thought my experience of two cases of this disease, presenting some special features of interest in connection with its etiology, and perhaps suggesting a means of relief, if not of cure, might perhaps be of service in elucidating the natural history of this obscure disorder. During my residence in China, I had an opportunity of seeing the only two cases of hydrophobia which, so far as I have been able to ascertain, have ever occurred among the European residents in that empire. Rabies is by no means uncommon among the native dogs, but not so much so as one would expect from their neglected condition and cruel treatment. The cases to which I refer created great interest, I may almost say excitement, among the European community at the time, not only from the rarity of the affection, but also from the circumstances under which they were presented.

The first case occurred during the hottest part of the season of 1866. The sufferer was a young Englishman in robust health, tea-taster in one of the leading mercantile houses, who had recently arrived from England, and, like many of the new comers, had been attacked with an abundant crop of boils; some of these, in the neighbourhood of the ankles, had become somewhat ulcerated from rubbing. On the Sunday afternoon, he had been awakened from a nap by his little English bull-terrier licking one of the ulcerated spots on the ankle. The dog had been observed for some days previously to be somewhat cross and snappish, and much less playful than usual; but this was attributed to the oppressive heat of the Chinese summer, of which this was its first season's experience. Within fourteen hours, the unmistakably characteristic symptoms of the dreadful disease had manifested themselves, and within thirty-six hours proved fatal. Morphine, and then the sulphate of atropia, in heroic doses, were injected hypodermically without the slightest effect. Extract of belladonna was applied with the same result along the spine; but the only relief obtained, and that for brief intervals only, was by applying an improvised ice-bag to the back, and the inhalation of chloroform as continuously as the greatly embarrassed condition of the respiration would permit. The infecting dog was destroyed before any more active signs of rabies developed themselves.

The second case presented itself in the person of another young Englishman, an *employé* in the Imperial Customs at Shanghai. He was brought to the General Hospital two days after the death of the preceding, and had been greatly impressed by hearing of it. His attention was drawn to what had hitherto been an almost imperceptible scar on the ball of the thumb, which had resulted from the bite of an "angry" dog in England, nearly two years before. It had now become irritable and red, but did not actually open or ulcerate; but in this case also the same terrible symptoms developed themselves with an equally rapid and fatal result.

These two cases involved me in a somewhat lively correspondence with my friend Sir Edmund Hornby, the Chief Judge of the Supreme Court, who, without having seen them, wrote to the papers, saying he believed they were cases of a purely nervous character, terminating fatally from the intensity of the mental impression, and that he had seen many cases of the same kind

during his official residence in Constantinople. But of the true hydrophobic character of these two cases there could be no doubt whatever in the minds of all who saw them. Indeed, I for one do not know any disease of which the symptoms, in form and sequence, are more characteristic. The pathogeny of the disease in each of the cases in question was peculiar. In the first, the inoculation was effected by the saliva of a dog in whom the disease was not markedly developed, and then by absorption from the ulcerated surface. This did not prevent the disease from being at once developed, and running its course with extreme rapidity. In the second case, the original site of inoculation nearly two years before had completely healed, but the poison evidently remained latent in the system until the circumstance of a new case again directed the mind of the patient strongly to his own experience, with an intensity sufficient to rouse the slumbering mischief into fatal activity. It is impossible, I think, to overlook the mental impression as an important factor in the morbid process, where a sufficient predisposing etiological element exists in the potentially affected organism. The exciting cause need not be essential in character, and very often is here as elsewhere out of all proportion to the morbid action which it initiates.

Among the pathological lessons taught by the study of this disease, is to be noted the variety in the morbid species produced by transmission from the lower animals to man. The natural history of hydrophobia shows abundantly that, in the lower animal, very often the phenomena of the disorder are altogether less strikingly developed, and do not present that terrible intensity which agonises the human sufferer and appals the beholder. The dog may only appear dull and stupid and disinclined to play, perhaps a little cross and snappish with strangers, able to swallow both solids and fluids, as shown by voluntarily licking its master's sores, showing therefore none of the purely hydrophobic phenomena, and yet be capable of communicating the malady in its most acute form to man, in whom the hydrophobic character is so markedly pathognomonic.

I do not know that I would have thought these reminiscences of hydrophobia of sufficient interest to add them to the already teeming literature of the subject, except that, in recalling the individual symptoms, I remember one at least which suggests that, in a recent proposed addition to our *materia medica*, we may possibly have a means of relieving the most distressing symptoms of hydrophobia, if not of eliminating the poison itself and curing the disease. In the first of these cases, I particularly noticed that there seemed to be an entire suspension of the functions of the whole salivary apparatus. The tongue, mouth, and fauces were perfectly dry; and of this condition, and an intense sensation of thirst apparently associated with it, the patient chiefly complained as his greatest source of distress in the intervals of the tetanic spasm. Strong efforts only resulted in the collection of pieces of tough viscid mucus, which could not be swallowed, and which were ejected with frequent and difficult efforts. This is in striking, and, as I would point out, important contrast to the dog, where the saliva may be seen flowing abundantly from the open mouth. The specific animal as well as the mineral poisons, appear to have a special affinity for particular organic systems, as the vehicle or apparatus for their elimination from the body. Of these organic systems, the skin and the salivary glands seem to be by far the most active, and it is more than probable that their action is mutually vicarious. These facts are too well known to require any further illustration. Now, as the saliva is evidently the secretion in which the poison of rabies, in the dog at least, is found most abundant, and by which it is propagated, it follows that the salivary glands must be largely, if not specifically, involved in the morbid action. If we find, then, the whole salivary function suspended, or at least impeded, in cases of hydrophobia in the human subject, ought we not to accept the physiological indications so plainly presented, and endeavour to restore the action of the salivary glands as the special emunctories of the morbid poison. I think that this is the direction in which we are to look for our remedy; and I believe that it will probably be found in the *jaborandi* of Mexico, the latest transatlantic addition to our *materia medica*, and which has shown itself to be the most potent sialagogue and diaphoretic known. The only cures of hydrophobia (for such are reported on credible authority) have been in cases where either the morbid nervous phenomena have been reduced by their physiological antagonistic curare, while the *materies morbi* has been allowed to exhaust itself, or its elimination has been left to the natural efforts; or, on the other hand, where the excretory action of the skin and salivary glands have been excited by the hot-air or mercurial bath. Even admitting that such cases were not those of true hydrophobia, at least they are evidence that symptoms, markedly partaking of this grave character, have been at least relieved by rousing the action of the skin and salivary apparatus.

The dose of the powdered leaves of *jaborandi* is from sixty to eighty

grains; and, as no dangerous effects have attended the somewhat free experiments hitherto made with it in the healthy subject, it may be given with confidence. I would propose that an infusion of one drachm of the powder, in an ounce of water, be injected at a blood-heat into the rectum, and repeated every two hours until the full influence of the drug is established. If there be intolerance of the simple infusion, it may be medicated by the addition of liquor opii and starch, so as to facilitate its retention. If the active principle of the drug could be obtained, it would, of course, be much more easily managed in the form of a concentrated solution for hypodermic injection. The liquid jaborandi of Messrs. Ferris and Co. I have found to be a reliable test. The dose is from five to ten drops. It is therefore presented in a handy form for injection either *per rectum* or hypodermically.

ON THE TREATMENT OF HIP-JOINT DISEASE BY EXTENSION WITH MOTION, AS PRACTISED BY THE AMERICAN SURGEONS, INSTEAD OF LONG-CONTINUED REST AND IMMOBILITY.*

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THE object of the present paper is to direct attention to the recent advances which have been made in the treatment of hip-joint disease by the American surgeons, to whom we are indebted for the discovery of two very important principles, and also for their practical application by means of most ingeniously contrived instruments.

The first principle is that of extension, as a means of relieving the most acute pain in joint-diseases, especially applicable to the knee and hip-joints.

The second principle is that of extension combined with motion during the progress of disease, the patient being allowed to walk about, so as to promote recovery with free motion in the joint, instead of the ordinary result of ankylosis obtained by long-continued rest and immobility.

There can be no doubt that the discovery and practical application of these two principles have completely revolutionised the treatment of joint-diseases, and changed our opinion with regard to the pathological conditions existing, especially as to the production of acute pain which, formerly, was believed to depend upon acute inflammation, requiring active local, as well as general antiphlogistic treatment, such as leeches, blisters, calomel and opium, etc. It has now been proved to depend upon undue articular pressure and contact of inflamed surfaces, produced by reflex muscular contraction, and capable of relief by mechanical means alone, producing extension, whether this be applied by means of the weight and pulley, or by the screw and cog-wheel.

The object of extension is not, as generally supposed, to separate articular surfaces, but to overcome reflex muscular contraction, and, by relaxing the muscular rigidity, to prevent undue pressure of inflamed articular surfaces, or their margins, when the joint is held in a flexed position by muscular contraction.

Extension, for the relief of pain, is applied by means of the weight-and-pulley apparatus whilst the patient is in bed, the extension always being made in the same direction as the long axis of the limb. It will vary, therefore, when first applied, as the leg may be flexed, adducted, or abducted; but as soon as the reflex muscular action has been overcome, the weight will be made to pull in the direct horizontal line. After the pain has subsided, the object with which the weight-extension is continued is to secure sufficient rest to the joint, and at the same time permit a limited amount of motion, as the patient varies his position in bed. It is not found, by experience, that the limited amount of motion thus permitted in any way interferes with, or retards, the favourable progress of the case; but, on the contrary, this may be looked forward to with confidence in the great majority of cases after the pain has been relieved by the weight extension. The health of the patient also improves rapidly after the relief of pain.

The successful application of weight-extension as a remedy for pain, however acute it may be, in joint-disease, is the greatest discovery of modern times in the treatment of these affections. The originality of this discovery is claimed by Dr. Henry G. Davis of New York. In his work on *Conservative Surgery*, published in the year 1867, at

page 206, Dr. Davis observes: "We consider it fully established that, when disease about a joint renders the movement of that joint painful, the joint is always liable to be destroyed by uninterrupted pressure effected through the contraction of the muscles passing over it." And again at page 212, "In diseases of joints, we were the first to point out, as an always present factor in their destruction, the existence of unremitting pressure, as effected by contraction of muscles passing over the joints, causing constant forcible apposition of the surfaces within the joint. This is a general principle appertaining not only to the hip, but to all joints similarly affected. The application of this universal principle should guide us in any joint-affection, whether the disease be internal or external, as soon as the disease renders the movements of the joint painful. When this fact was fully established in our mind, we were led to seek the best way of counteracting the contraction of the muscles, and soon came to the conclusion that a constantly acting force, however moderate, must eventually weary muscles by giving them no respite. We adopted the weight as applied by means of the cord, pulley, and adhesive strips for this purpose, when the patient was confined to his bed or couch. This answered the indication perfectly, relieving all pain and constitutional disturbance, enabling the patient to enjoy his days free from pain, and to rest quietly at night, to relish his food, and to be nourished by it; in short, it robbed the disease of all its terrors".

Dr. Davis does not precisely state the period at which he arrived at the above conclusion as to the cause of the acute pain and its method of treatment; but it must have been anterior to the year 1855, which is the date affixed to his extension splint by the instrument-makers Otto and Reynders of New York. At page 308 he states: "In 1856, I had fully established the treatment of morbus coxarius upon the plan of overcoming the pressure effected by the muscles, through the means of *continued elastic extension*, and the mode with its results was very flatteringly commented upon by one of the editors of the *American Medical Monthly* of this city, in March 1857."

There can be no doubt that interarticular pressure, or the pressure of inflamed articular surfaces—one surface being generally pressed against the margin of the opposite articular surface—must take place when the joint is drawn into a flexed position by the rigid contraction of the muscles, more or less of a spasmodic character, which always coexists with the period of acute pain. Mr. Hilton has particularly pointed out this fact in his *Lectures on Rest and Pain*, and has explained it to be the result of reflex nervous irritation, depending upon the anatomical fact of the various muscles surrounding the joint being supplied by branches of the same nerves, which are also distributed to the interior of the joint. The explanation of this period of acute pain in joint-disease, and its dependence upon interarticular pressure, produced by the abnormal contraction of the muscles surrounding the articulation, has been brought before the profession in a very able paper by Mr. Howard Marsh, in the *St. Bartholomew's Hospital Reports*.*

The English idea has always been rest and immobility to the joint. The American idea, during the last ten years, has been extension with motion, *i.e.*, preserving motion in the joint whilst the pain is relieved by extension.

In the treatment according to the English system, immobility of the joint is obtained by various instruments and splints; from that piece of surgical antiquity, the *long straight splint*, reaching from the axilla to the foot, necessitating the confinement of the patient in the horizontal position for many months, and many other contrivances, such as metal and leather splints to the joint, which permit the patient to move about on crutches, to the now somewhat fashionable Thomas's splint, invented by Mr. Thomas of Liverpool, and described in his recently published work.

All these means succeed, more or less, in relieving pain and promoting recovery, although ankylosis is frequently produced, and this has generally been regarded as the most desirable termination; but in many cases they all fail in relieving pain, for want of the American extension principle, and also they do not prevent the occurrence of dislocation, or partial dislocation, the effect of which is to produce shortening of the limb with permanent lameness.

An example of this occurred recently in my own practice, dislocation, or partial dislocation, taking place whilst the patient was wearing a Thomas's splint. A young gentleman, aged 6, was brought to me in March of the present year, suffering from slight symptoms of hip-joint disease; no pain, but limping, with muscular rigidity, and and slight flexion of the hip-joint. I ordered Thomas's splint, which

* Read in the Section of Surgery at the Annual Meeting of the British Medical Association in Manchester, August 1877.

* On the Prejudicial Effect of Interarticular Pressure in Joint-Disease; and the Application of Continuous Extension by means of a Weight, as a Remedy for this Condition. By F. H. Marsh.—*St. Bartholomew's Hospital Reports*, vol. ii. London: Longmans, Green, and Co.