A Clinical Lecture

ON

ENURESIS AND ITS TREATMENT.

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VIEWED from the standpoint of pathology, or in relation to its effects upon the general health of the patient, enuresis may appear a trivial and unimportant complaint, and unfortunately in the class from which hospital patients are chiefly drawn there is a tendency to regard it in that light, at any rate so long as its manifestations are comparatively infrequent. It is unfortunate that this view should prevail, because there are few ailments from which children suffer where the force of habit plays so large a part; and there are few habits which exercise a more marked effect upon the moral and mental well-being of the patient, or, in later years, upon his material prospects. The child in whom the habit is established is almost always timid and reserved, and not infrequently slow and dull, though it may perhaps be contended that these characteristics are associated with the condition rather in the nature of cause than of effect. As time goes on and the condition remains unaltered, it becomes a severe handicap in his life. He cannot remain at a school for more than a very brief period; and after puberty the persistence of the condition closes to him a considerable number of occupations, besides leading to physical and mental discomfort in a marked degree. From these considerations it will, I think, appear that the condition is of more importance than would at first sight be evident.

PATHOLOGY.

When we consider the act of micturition in an infant, it is evident that the evacuation of the bladder is a purely reflex phenomenon. A comparatively slight stimulus to the cutaneous nerves, such as is conveyed by the exposure of the body, is often sufficient to set the mechanism of the reflex in action. This active condition of the reflex persists in the majority of infants throughout the first year of life, but by the second birthday it has as a rule passed under the control of the will, and though occasional lapses may occur in the third year of life, anything like a frequent occurrence of incontinence of urine is distinctly pathological. I must here note that the education of the infant in regard to the power of control over the bladder is not to be neglected, and that an efficient nurse can often so train an infant that at the age of 18 months it can retain control of its urine during a sleep of eight to ten hours. If after the infant has reached 2 years of age the reflex evacuation of the bladder is still excited by slight stimuli which in the normal child would have no effect, the condition of enuresis must be recognized.

The greatest number of cases of enuresis occur between the ages of 3 and 10 years, though it is not very uncommon to find the condition acquired by older children; where, however, one finds it existing in adults, the history almost invariably is that they have suffered from the complaint from childhood. I have, however, notes of one case in a girl of 18 who had acquired the condition about a year and a half previously, and I have seen at least one similar instance. It is usually said that the two sexes are about equally affected, but in my own experience girls outnumber the boys by more than two to one.

As a general rule the patients are able to retain control of the bladder, at least to a moderate degree, during the day, but this control disappears during sleep; but in a certain number of cases enuresis occurs by day as well as in the night, and in a still larger number the diurnal control is less firmly established than in normal children, so that, unless there are frequent opportunities of evacuating the bladder, the child becomes abnormally uncomfortable, and finally loses control.

The character of the evacuation is nearly always the same—that is, there is a sudden uncontrollable contraction of the detrusor muscle and the contents of the bladder gush out. Occasionally, however, one meets with instances where this is not the case. One of my patients, a boy aged 4, was said by his mother “to drip

like a tap,” and the unusual description raised the suspicion that there was present some material cause, such as the presence of a calculus—a suspicion which was not confirmed. Since then I have met with some similar instances, but they are not common. Sometimes—and this is especially true in neglected cases, where the condition has been present for years—the bladder seems to have become so irritable as to be unable to tolerate the presence of more than a few drachms of urine at a time, so that the patient passes urine at intervals of a quarter of an hour by day and night. This condition has, I believe, led to the description which is found in some textbooks of a bladder which has become abnormally small. I have never been able to satisfy myself that this was the case; the bladder in this condition will always hold a normal amount of fluid.

From the consideration of the facts observed I believe, therefore, that the ordinary cases of nocturnal enuresis really represent a persistence, or a recurrence, of the normal infantile reflex irritability. However, there are causes, more rarely met with, which may be overlooked. That which is perhaps most likely to escape detection is the minor form of epilepsy. This is certainly not a common cause of enuresis, but there are a certain number of cases in which, after other methods have failed to effect a cure, a dose of 5 gr. of potassium bromide at bedtime has been immediately successful. In some of these cases there are other evidences of *petit mal* to be discovered by careful inquiry, but that is not always the case.

Mentally deficient children are not infrequently the subjects of nocturnal enuresis, which is a survival of the infantile condition. Stress is often laid upon the presence of dirty habits in determining the diagnosis between imbecility and backward development, but it is a point which should be most carefully considered, for an infantile condition in this respect may occur in backward children up to the completion of the fourth year without any real cerebral defect.

With regard to diseases of the spinal cord, the only common cause of incontinence is compression of the cord in the lumbar region consequent upon tuberculous caries of the vertebrae. Ordinarily the affection is an overflow incontinence. The bladder dilates, and after the lapse of a certain time the sphincter is unable to resist the pressure of the accumulated urine, which flows slowly away. Occasionally the bladder contracts uncontrollably on the slightest stimulation, which is usually not obvious, resulting in the condition known as precipitate micturition. But in these cases, even where the angular curvature is not a marked feature, there is nearly always a definite paraplegia, and the bladder symptom is a late manifestation. A rare and obscure cause of incontinence is the presence of an occult spina bifida, but here also there is an associated paralysis or paraplegia of the lower limbs. Hence it is quite improbable that the incontinence which accompanies these conditions will be confounded with a case of simple enuresis. The same remark applies equally to the common diseases of the bladder which are associated with incontinence, stone, tubercle, and new growth, and the ordinary forms of cystitis.

So far I have considered the causes of incontinence of urine which have a definite basis in some pathological condition of the nervous or urinary mechanism, and in examining any case of enuresis it is necessary to exclude the presence of such a cause before deciding that the enuresis belongs to the category of neuroses. When no sufficient cause can be discovered by physical examination, and when the history and symptoms of the case present nothing which can arouse a suspicion of the presence of some unusual cause, I think one is justified in considering the case as one of simple enuresis. Now, though in enuresis it is not possible to point definitely to the determining cause, it is easy to indicate many of the factors which predispose to the condition, and when we consider these it is evident that they have all one common feature: they all act in some way as stimulants of the afferent nerves. Now, in infants, I pointed out that almost any form of stimulation sufficed to set in motion the mechanism by which the bladder is evacuated, and the more closely one studies the character of the enuresis of childhood, the more clearly one perceives that it merely represents a recurrence to, or a persistence of, the infantile condition. There is in many medical textbooks much talk of a weak

sphincter, of a loss of muscular tone, and similar defects, but I am unable to convince myself that these explanations have any foundation in the facts. On the contrary, if one goes into the history of the precise sequence of events in a case of enuresis in an intelligent child, it becomes obvious that the sphincter is efficient up to and even beyond the normal, but that the voluntary control is not established so firmly as in healthy individuals. It is rare to find the urine dribbling away in this condition; it nearly always comes with a sudden gush; in other words, the spinal centre temporarily has got out of control of the cerebral centre. From these considerations it becomes clear that enuresis is a phenomenon related to an instability of the nervous system—a conception which is confirmed by the frequency with which it follows such a disease as diphtheria.

I do not think it is possible in the present state of our knowledge to obtain any more precise view of the definite cause of the disease, but fortunately it remains possible to trace out and attack some of the causes which most commonly excite the irritable reflex. Probably that which is most common is the presence of adenoid vegetations in the naso-pharynx. I should be expressing myself more cautiously if I were to say that it is a condition found with great frequency in cases of enuresis; for it is a tenable hypothesis that the same conditions of health which led to the growth of the adenoid vegetations produced at the same time the nervous instability. But, whatever may be the precise pathology, there can be no doubt that there is an intimate connexion between the presence of adenoids and the existence of enuresis, and that the removal of the hypertrophied lymphoid tissue is the first essential step in the cure of the enuresis.

Another commonly-associated condition is the presence of threadworms. Whether these act directly as stimulants to the afferent nerves, or whether the condition of the bowel which favours their existence is the exciting cause, I believe that it is important to eliminate this factor in the production of enuresis. Jacobi lays stress on the existence of small anal fissures in children who suffer from the complaint, and I should be quite prepared to accept these as a sufficient cause if I had been able to detect them; but I have examined a considerable number of children with special reference to this point, and have not met with a single instance.

Another factor in the causation, as to which I am sceptical, is the presence of vulvitis in girls, and balanitis or phimosis in boys. These ailments are so common among the children of the poorer classes that, if they were efficacious in causing enuresis, I should expect that complaint to be far more common than it is. But, where every possible excitant of the afferent nerves is under suspicion, it is necessary to insist on attention to absolute cleanliness in children who suffer from enuresis.

Next there is a group of cases in which the urinary secretion itself acts as an irritant. Hyperacidity is certainly found in some instances, and is sometimes associated with the passage of uric acid, and of a highly concentrated urine. Many authorities doubt the connexion between the phenomena, but there exist cases where the administration of an alkali in fairly large doses effects a quick cure of the incontinence, and on the whole it appears to me to be probable that hyperacidity is a sufficient exciting cause.

In convalescence from typhoid fever it sometimes happens that the urine becomes cloudy from the presence of large numbers of bacteria in the urine, and in this condition I have twice met with children who have acquired enuresis, which speedily disappeared with the disappearance of the bacteriuria. In a few other instances I have found a bacteriuria in children suffering from enuresis, and, though I do not regard it as a common cause, I always examine the urine directly it is passed. In those cases where bacteriuria is present the cloudiness does not disappear after heating or by the addition of acid, and the bacteria can be easily detected by the microscope. There are not any symptoms of cystitis in these cases, so that, unless the examination be made methodically, they are apt to be overlooked.

In a healthy child none of the factors I have mentioned will produce enuresis of itself; there must be other adjuvant causes. The subjects of the complaint are generally anaemic, listless, undergrown, or ill-fed, and often exhibit other signs of nervous instability; they

suffer from night terrors, migraine, hysteria, and neuralgia; and there is a certain amount of evidence which points to an inheritance of instability. Thus it is not infrequent to see several children in one family affected, one or both of whose parents suffered from the complaint in childhood.

To summarize what I have said as to the pathology and etiology of the disease, there is as a basis a condition of nervous instability, which may be inherited, or is often acquired, as in those cases which follow an attack of diphtheria. Acting on this, there are a number of exciting causes, which may be grouped in three divisions: (1) Those which act on the nerve centres in the brain, as in epilepsy; (2) those which act on the cutaneous peripheral nerves and excite reflex action in the unduly irritable spinal centres; (3) those which produce irritative effects in the urinary tract.

TREATMENT.

Two points require emphasis. The first is that in order to ensure success prolonged treatment is necessary, and this for several reasons. Usually the condition has been allowed to become a habit before it is taken seriously, and it requires a long time under new conditions to break the force of the acquired tendency; and, again, though success is sometimes obtained early, relapse is frequent unless the treatment is sustained. The other point is the necessity of varying the surroundings of the patient; some patients who derive no benefit whatever from treatment so long as they continue their ordinary mode of life, improve from the moment that they are removed to a different environment, the reason probably being that some one or more of the exciting causes present in the home life of the patient are eliminated by removal to a different surrounding.

In nocturnal enuresis the evacuation of the bladder takes place as a general rule in the first two hours of sleep. Therefore the first instruction to be given is that one hour, or one hour and a half after the child has gone to sleep, of course with a bladder properly emptied, it is to be awakened, and made to pass water again. This precaution in a considerable number of cases is sufficient to prevent the enuresis, but occasionally one meets with cases in which one awakening is insufficient, and then it is a wise plan to manage so that the child is awakened at regular intervals throughout the night; the intervals, of course, are made longer as improvement occurs. Secondly, it is of advantage to encourage regular habits during the day. The bladder should be emptied only at stated intervals, and these should be as far apart as is consistent with the comfort of the patient. This measure is especially valuable where there is diurnal as well as nocturnal enuresis, for in such instances there often grows up a habit of unnecessary evacuation. It is sometimes stated that the bladder becomes contracted and incapable of retaining more than a few ounces at a time, and though there may be such cases, I can only say that they are outside my own experience, and that, as a rule, in enuresis the amount evacuated is quite equal to the normal contents of a healthy bladder.

The next point of importance is to avoid those articles of food and drink which have an irritative or diuretic effect. Tea and coffee are to be absolutely prohibited; and the last meal and the last drink should be taken at least an hour before bedtime. In addition to tea and coffee, sugar in all its forms must be eliminated from the diet. Sweets are most potent causes of relapses. With these exceptions, the ordinary plain diet suited to healthy children is permissible, for though some authorities advocate the elimination of meat from the diet, I have never seen any reason to follow that rule. It is a common practice of mothers to limit the amount of fluid taken by the patient, but I have no doubt that the consequent increase in the concentration of the urine is apt to increase the tendency to enuresis. On the contrary, the child should be permitted to drink water or milk as it desires, provided it be taken at regular times and limited in quantity at the last meal.

In nervous, excitable children, school work should be discontinued for a time, but in the children of the poorer classes this is not always attended with the desired result, for they find excitement in the streets. When the diet and the habits of the patient have been corrected, there are further measures which aim at the elimination of the

exciting causes. Scrupulous cleanliness, the removal of adenoid vegetations, the treatment of anaemia, and the importance of air and exercise, must receive proper attention. In boys, circumcision is sometimes advisable, and if threadworms are present, special measures must be used to get rid of them, ordinarily an easy task.

The question of drugs is important. The number that have been employed is enormous, and many of these have been praised as efficacious. I have used a large variety, but have found three only of much service, and of these three belladonna or atropine is by far the most successful. It may be used in the form of the extract, or the tincture, or as liquor atropinae, and each has its advocates. I do not regard the point as essential, though personally I always employ the tincture. What is essential is that the dose should be sufficient to produce evidence of its action, and that it be used over a long period. I usually give 10 minims of the tincture three times a day as the initial dose, and raise the dose week by week up to a drachm three times a day. With these doses in a large number of cases immediate benefit is obtained, and usually as time goes on the frequency of the enuresis sensibly diminishes, and finally disappears. At this period it is essential not to abandon the drug, but to slowly diminish the dose until it can safely be dispensed with. A period of three to six months will usually be required for the permanent relief of the complaint, but occasionally there are cases where that time must be considerably prolonged.

The danger of poisoning is slight. Of the many cases I have treated in this manner only one has had delirium, though loss of accommodation is nearly always present in the beginning. This, however, soon passes off, and it is not an indication for relaxing the use of the drug. Dryness of the throat and mouth and a smarting sensation in the pharynx are also complained of sometimes, but these also are temporary discomforts. I employ the belladonna in conjunction with potassium citrate in the majority of cases, and in a few instances where I have had reason to believe that hyperacidity of the urine was the chief cause I have found potassium citrate alone to be efficacious. The third drug which has proved successful is urotropin, and this is especially indicated in cases of bacteriuria. It must be given well diluted, for in concentrated solutions it has been known to produce haematuria, and painful micturition. I used it on a series of thirty consecutive cases, with good results in nine instances.

Of other drugs my experience has been disappointing; I have never succeeded in obtaining good results with ergot, antipyrin, rhus aromatica, lycopodium, or any of the other drugs which others have found useful. In excitable children, who are the subjects of night terrors, a small dose of potassium bromide at bedtime is beneficial, and in ill-nourished, anaemic children, iron and strychnine are good tonics.

Electrical treatment, with one pole in the urethra, or over the pubes, and one on the lumbar region, is said to succeed where other measures fail, but it also fails frequently, and I cannot ascertain that the cases in which medicinal treatment fails are cured by the employment of the electric current. It is true that all treatment in this complaint is empirical, but in my experience comparatively few cases resist, if the treatment indicated is perseveringly carried out. When, however, failure still attends one's efforts at the end of six months and there is no sign of improvement, the patient should be removed entirely from his or her surroundings, and placed in bed under supervision. What have been apparently hopeless cases often derive striking benefit from such a course, and the force of habit thus attenuated, the final results are usually good. I believe that the prospects of treatment are better than is usually supposed. I estimate that between 70 and 80 per cent. of my cases get well in about four months, that 10 to 16 per cent. recover in about eight months, and that from 1 to 2 per cent. remain almost as bad as before. Of these last, however, I do not despair; some of them are improved; all are capable of improvement, but subject to relapses. The only point remaining to notice is that I find boys more amenable to treatment than girls, and that the most hopeless cases are those in which mental development is below the average. Of cases occurring in young adults I have little experience, but I believe that the majority are in girls, and that they are usually cases where treatment in earlier years has been spasmodic or even wholly neglected.

THE CAUSES AND TREATMENT OF ENURESIS.*

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THIS is a subject in which I have long taken great interest, and in 1899 I published in the *King's College Hospital Reports* my ideas on the matter, which followed a number of cases successfully treated by an antidiabetic diet. Since then many failures by this treatment, together with more work at the subject, have induced me to alter my views, or rather to enlarge them.

I will now endeavour to offer an explanation of the conditions which brings all the varieties of this malady into line, and of the reasons for the success or failure of the various treatments in common use.

CAUSES.

Nocturnal enuresis is a symptom the causes of which are believed to be various. Dr. Goodhart, in his work on *Diseases of Children*, says:

There are few conditions which require more careful study than this, and few in which such a variety of circumstances conspire to bring it about. Whoever will treat enuresis with success must be prepared for a preliminary inquiry of a somewhat complicated nature.

This opinion becomes confirmed on reading the views of various writers on the subject, for it is found that hardly any two are in agreement as to the causes of this distressing malady. It may be that as the causes are admittedly various there is some truth in all. It will be our endeavour, then, to extract from this mass of contradictory material some general ideas which may bring these dicta into harmony, and so formulate a broad basis for treatment.

Condition of the Urine.

All writers agree that the urine shows variations from the normal. Owen noted that the urine might be acid or alkaline. At times it is extremely acid, loaded with urates and of high specific gravity. In these cases it is held by some that, being abnormally irritating, the urine excites the reflex act of emptying the bladder without the intervention of the consciousness. The more common variation, however, is a condition of low specific gravity, neutral or alkaline urine with triple phosphates or oxalates, a few pus cells, and a trace of albumen. Then it must be the amount of the urine which excites the reflex, for the quantity passed in twenty-four hours, and especially at night, is thrice or even more times than the normal. There is, in fact, a condition of polyuria. It is quite common to find a bed deluged with urine an hour or so after a child has been taken up and made to pass water.

Typical examples of urine from enuresis cases are as follow:

(a) Specific gravity 1030, highly acid reaction. Total quantity in 24 hours, 20 oz. Colour, mahogany. Urea, 6 per cent. Deposit, uric acid crystals in abundance. No albumen or sugar.

(b) Specific gravity 1005. Alkaline reaction. Total quantity in 24 hours, 3 pints. Colour, very pale straw colour. Urea, 0.3 per cent. Deposit, triple phosphates with a few pus cells. Trace of albumen. No sugar.

Condition of the Patient.

But if the urine is admitted to be abnormal, there is an equal agreement that the subjects of the complaint are also abnormal. The varieties of this abnormality have by different writers been made to include a very large number of the disorders to which the flesh of childhood is heir. Rachford found anaemia in 80 per cent. of his cases, and it is always present in the alkaline class. Trousseau says enuresis is essentially a neurosis, and often found in families prone to epilepsy. Some have considered it a mild form of nocturnal epilepsy. Goodhart says the tone of the nervous system is at fault. Some authorities have described the sufferers as mainly of a neurotic type, whilst others as flabby, anaemic, and lymphatic. A vasomotor neurosis of the renal vessels has been suggested as an explanation. Whitla finds enuresis very common in the neglected children sent into the industrial and charity schools, where it is often associated in its worst forms with a low standard of intellectual development. Ashby

* Read at a meeting of the Folkestone Division of the British Medical Association.