ANALYSIS AND TREATMENT

OF 150 CASES OF CHOREA.

MINOR.

Being a Thesis for the Degree of M.D.
of Edinburgh University

by

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M.B., Ch.B., 1902.

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While House Physician to the Leicester Infirmary and also to the Ancoats Hospital, my attention was drawn to the number of patients, under the age of 20 years, who came to the out-patient departments of these hospitals, suffering from chorea. I kept records of these cases and have chosen 150 of them, and to their analysis and treatment I will now refer

Of the 150 cases some 100 became ward patients, so I was enabled to watch them more carefully. The remaining 50 were treated as out-patients.

Taking the sex of the patients it was found that of the 100 in-patients there were

87 girls,

23 boys,

which gave an average of 1 boy to 3.7 girls. Of the/

the 50 outpatients, there were

32 girls,

18 boys,

or 1 boy to 1.17 girls, giving with the two combined an average of 1 boy to 2.9 girls.

These figures compare favourably with the statistics of other observers, for Ashby[1] gives the ratio as being 2 boys to 5 girls, Taylor[2] 1 boy to 3 girls, and Osler[3] 1 boy to 2 girls. Chorea is thus much more common in girls than in boys, due perhaps to the fact that girls are much more delicate constitutionally than boys are, and also to the fact that the various changes that take place in a girl's life when she reaches puberty, render her more susceptible to any disease, especially those likely to affect the nervous system.

Taking the age incidence of the cases it was found that the greatest number of cases were between the years 10 to 15. Girls were more affected than boys ~~were~~ between the ages of 5 and 10, and between the ages of 15 and 20 years, the latter range being due to the influence of puberty upon the girls.

Dividing the years into intervals of five, the following table shows to us the number of cases taking/

taking place under each decade and also the proportion of girls to boys under such divisions:-

Years	Girls	Boys.
1 - 5	1	0
5 - 10	38	13
10 - 15	52	27
15 - 20	28	1

As regards the influence of town life upon country life, 138 patients were town dwellers, while only 12 patients belong to the country. Here again, perhaps the want of proper nourishment amongst the children of the poor in towns, for of course the greater majority of these patients belonged to the poorer class, may be a factor in the prevalence of chorea among town children. Then the unhealthy atmosphere in which town children live, coupled with the fact that they are often the offspring of immature and delicate parents, especially in factory towns, may also account to a certain extent for the great number of cases among the town children as compared with those reared in the country, and whose parents from their open-air life are more robust in constitution.

The/

The seasonal incidence is interesting. Most of these cases become patients during the winter months, especially in the months of October and March. Only a few were met with in the summer. This range, it may be noticed, is very similar to that of rheumatic fever, and it is in this that the first relationship existing between chorea and rheumatism is seen. Rheumatism, as is well known, is much more frequent in the winter months than in summer, and it is worth noting also that in Leicester, where the majority of these cases of chorea were met with, that rheumatic fever, acute and subacute in character, and chronic rheumatism seemed to be exceptionally prevalent, especially amongst the poorer classes. Then, again, it is the poorer classes that suffer most in winter from sickness, owing to the want of proper food and clothing and by exposure to the weather, thus paving the way for rheumatic affections.

Various causes were given by the parents or the children themselves for the onset of the chorea. Fright was given as a cause in 9 cases. On closer questioning, however, in only 2 cases could fright be the probable cause of the attack. These were two/

two boys, one aged 19 years, who stated he received a fright in trying to escape from a runaway truck of coal, the first symptoms in his case appearing within 48 hours of the fright. The other boy, aged 14, was frightened by falling into a large tub of water, the symptoms in his case appearing about a week later.

As to the hereditary nature of chorea, if any, previous attacks had taken place in the family in eight cases.

A history of nervousness or of "weak nerves" as the parents described it, was present in the family history of 27 cases. The mother of the children accounted for 23 of these cases.

Imitation as a cause could not be found though Osler[4] mentions an epidemic which he, however, states was probably due to hysteria

School work was given as a cause in some cases. It was very doubtful, and except in the case of a delicate boy or girl working too hard at their lessons, which may be a cause, yet there must be at the bottom a cause much more powerful than this to bring on such a disease.

Eye/

Eye Strain has been advanced by many observers as being a possible cause of chorea. Although several of these patients were hypermetropic and a few slightly myopic, yet in only one case did the patient require glasses to correct her vision, and she had worn them for 12 months previous to the attack of chorea. Thus eyestrain does not seem to be a cause of chorea. This belief was further strengthened by observing the children who attended the Eye Department at Leicester. In no case did I find any symptoms of chorea in those children, although I suppose I did retinoscopies on over 100 children.

Chorea and Epilepsy have been recorded as occurring in the same person. I could find no such history in these cases, though in one family the sister of the patient suffering from chorea was subject to epileptiform seizures.

Various other causes have been given as a factor in producing chorea among which are poisons, erosions of the mucous membrane of the nose, and worms. With regard to the presence of the latter, it is interesting to note two cases of chorea recorded by Dr Burnett(5), both of which were associated/

iated with the Taenia Solium. Improvement took place after the removal of these worms. Both patients were neurotic females, and there was also a history of rheumatism in each case. Probably the chorea here was due to a certain amount of reflex irritation, owing to the presence of the tape worm.

I now come to what is given as the chief factor in the production of chorea, viz., rheumatism. Of the 150 cases, 32 gave a distinct history of having had rheumatic fever. The time elapsing between the attack and the appearance of the chorea varied from three months to two years. Then a history of growing pains, often overlooked by the parents, but which are undoubtedly a rheumatic manifestation met with in children, was obtained in 64 cases. Taking the 32 cases who had rheumatic fever, there are 96 cases due to rheumatism or a percentage of 64%. This appears a high percentage, but shows the close relationship existing between chorea and rheumatism. With regard to this, I wish again to recall the facts of the similarity in seasonal incidence, and the large number of rheumatic patients who were met with at the same time as were the cases of chorea. Another fact worth noticing in/

in this relationship is the cases of rheumatic fever one meets during the progress of which chorea develops. I had three such cases, two boys and one girl, who while suffering from rheumatic fever developed choreic movements. These movements did not last long, disappearing about five or six days after their onset. Then again, during attacks of chorea, rheumatic manifestations are met with in the form of tonsillitis, rheumatic nodes, arthritis, and peri and endo carditis. Subjoined is the table showing the number of cases in which these complications occurred:

Tonsillitis	4.
Rheumatic nodes	2
Arthritis	6
Pericarditis and Endocarditis	7.

As regards the factor of rheumatism in the parents, 46 admitted to being sufferers from this disease.

In only one case could <u>scarlet fever</u> be traced as a possible cause, though Ross[6] states that chorea frequently follows it. This case was a boy aged 8 years, who was sent in to the hospital suffering from pain in his joints and peri and endocarditis/

endocarditis. There was no definite history of a scarlet rash, but the doctor stated that the boy had desquamated six weeks previously. A large amount of albumen was present in the urine on admission, along with some blood and casts. A fortnight after admission the patient developed choreic movements, and probably these were more dependent upon his rheumatic state than upon the previous history of scarlet fever. The chorea in this case only lasted a few days.

Other diseases have been given as a probable cause of chorea, but in none of them is the relationship found to be so close as it is in the case of rheumatism and not even in those cases which have proved fatal and endocarditis has been found at the autopsy(7) can rheumatism be regarded as a negligible factor, for no history of that disease is given.

Previous attacks of chorea are fairly common. In these cases 6 boys and 21 girls had suffered from previous attacks of chorea, and in 4 girl patients the present attack was the third of the series.

The Symptoms of Chorea: These are well known and/

and were present in all the cases. They consist of a series of involuntary, purposeless, jerky movements, accompanied by a certain amount of muscular weakness and inco-ordination.

The first signs that parents generally notice are the jerkings and grimaces of the child. From the histories the following table will show the various parts of the body first affected by the chorea as noticed by the parents:

Right arm and hand	46.
Left arm and hand	19
Head and face	29
General movements	37
Right leg alone	9
Left leg alone	5

Besides these there was one case, the principal symptom of which was paralysis of the right arm. The patient developed general choreic movements two days after admission. The movements in the majority of cases were severe, and it was noticed that the movements were more violent when the upper part of the body was affected. The movements seemed to be due to a kind of antagonism between the various muscles of the part affected. Thus, in the case of the arm muscle the flexors seemed to overpower the/

the extensors, and the supinators, the pronators, alternately, giving movements of extension, flexion, supination and pronation. The fingers were alternately flexed and extended. There was also muscular weakness present, the arm dropping after being held out for a very short time, and there was present also a certain amount of wrist-drop. A want of co-ordination was noticed in most cases, there being difficulty in picking up small things, also in writing. Weakness of the leg muscles was shown by the patient's walk. The movement was in some cases a shuffling of the feet along the ground. Many cases could not walk in a straight line, having a slight roll from side to side. The muscles presiding over the knee-joint were weak, and in several cases flat foot seemed to be an accompaniment due, no doubt, to the weakness of the calf muscles.

The respiratory muscles were affected in the more severe cases, as marked by the irregular breathing. The muscles of one side of the thorax appeared to lag behind those of the other side The diaphragm also lagged behind the intercostals instead of working synchronously with them, and in one/

one case the left side of the diaphragm moved irregularly with the right side. This was made more evident by placing the hand at the left costal margin, thus seeming to accentuate the irregularity. The abdominal muscles do not escape, but the movements here are slight.

The involuntary muscles appear to escape in chorea. There is seldom a complaint of colic made by the patients, which would be inevitably set up if the intestinal muscles were so affected. As regards the heart muscle I will speak later, when dealing with this organ.

The nervous system and sensory apparatus show the following departures from the normal.

Speech was definitely affected in 14 of these cases. In 13 it was simply confined to a jerky utterance of the words, due to the involuntary movements of the face and tongue muscles. The other case showed marked difficulty in speaking. The voice became hoarse, and as the chorea became more violent, words were spoken with difficulty and were guttural in sound.

Taste and Smell appeared unaffected.

Sight. Beyond the fact that there was present/

sent a certain degree of hypermetropia and also myopia in a few cases, there was no sign of optic neuritis, atrophy, embolism, or retinal haemorrhage to be seen. No case presented nystagmus, although the eyes shifted about from one object to another indiscriminately, due to slight chorea of the ocular muscles.

The sense of hearing appeared dull in several cases, but it was difficult to find out whether this had only existed since the onset of the chorea.

Headache was complained of by many of the in-patients. In some it was referred to the frontal region, in others to the occipital regions. Many cases were due no doubt, to gastric trouble, and it was more frequent in the girls than in the boys.

Turning to the general mental state of the patients suffering from chorea, they appeared bright and intelligent. Several showed a dull and list-less expression, as if they had no interest in their surroundings. Many were nervous, emotional, and irritable in temper, crying on the slightest pro-vocation.

Skin reflexes were all very active, especially the/

the epigastric and plantar reflexes, a very slight stimulus being all that was necessary to bring them out. Marked indrawing of the epigastric region was obtained in eliciting the epigastric reflex, the abdomen becoming almost scaphoid at the time. Stimulation of these reflexes seemed to be followed immediately by the general choreic movements of the patients examined.

Deep reflexes. These were also found active, and in several cases increased.

The knee jerk was found absent in six cases, normal in 79, increased in 37, and diminished in 28. In several cases where the reflex was increased, the "sustained jerk" associated with chorea was obtained.

The achillis jerk was normal in most cases. In 19 it was increased, rather more than is usually found in health.

No ankle or patellar clonus was got.

The triceps jerk was increased in 12 of the 100 inpatients.

The supinator and wrist jerks were obtainable in most cases.

The jaw jerk was distinctly obtained in one case, that of the youth already mentioned as having/

ing difficulty in speech. The motor nucleus of the fifth nerve must have been affected in some way by the toxin causing the chorea.

The organic reflexes were normal. No hyperaesthesia or anaesthesia was noticed.

The muscles were more irritable by both the galvanic and faradic currents. A much less stimulus was required to bring on a contraction than was needed in a patient not suffering from chorea.

Digestive System: The tongue was flabby and covered with a whitish fur, which was confined to the centre of the tongue, the edge and tip being free. Constipation was rather the rule. With regard to the tongue, it was protruded and withdrawn in a very sudden way, in most cases being literally "shot in and out" when the patient was asked to show it.

The blood in cases of chorea showed nothing abnormal. In some cases, where anaemia was present, there was a slight reduction in the number of red cells and percentage of haemoglobin. Blood films showed nothing likely to be set down to the attack of chorea. In order to see whether the toxin/

toxin which causes the chorea and which is said to be in the blood, could be demonstrated, I have lately been testing the reducing power of the blood upon such stains as potassium permanganate, methylene blue, and osmic acid, combined with fuchsia. The plan employed has been as follows:- 20 cmm. of normal blood are taken along with the same quantity of blood from a choreic patient. These are put in separate test tubes, and solutions of the above substances added to each. The tubes with their contents are then boiled for ten minutes, in a water bath to see if any change takes place by the action of the blood upon the solution. So far, the results have been negative.

According to many observers[8] the urine of choreic patients shows an increase in urea, and phosphates. Garrod[9] has found uro-haematoporphyrin in many cases, and looks on this as being a further proof of a close relationship existing between chorea and rheumatism. In these cases there seemed to be an increase in the urates. Phosphates were only in abundance in a few cases. Albumen was present in four cases, only one of whom had a previous history of scarlet fever. The quantity was/

was small and except in the case following the scarlet fever there was no blood present. Dr Carpenter[10] states that albuminuria may be produced by the arsenic which is given in these cases of chorea. I may state that three of these cases were treated with that drug, but instead of the albumen increasing, it diminished in amount, although the administration of the arsenic was continued.

The temperature in the majority of these cases was normal. A few showed a subnormal temperature. Irregular temperatures were present in 16 patients, the range being between 98°F. and 102°F. Four of these temperatures were due to the patients developing tonsillitis. Five had pains in the joints. Seven developed endocarditis and pericarditis so no doubt those irregular temperatures were due to the development of rheumatism.

Cardiac System: This is the system most often affected in chorea, for very few cases are met with in which the heart does not show some valvular trouble. Before dealing with the bruits and other abnormalities met with in chorea, I will tabulate the various lesions met with in examining these 150 cases.

No bruits ..... 51.
Mitral 65
Pulmonary 16
Aortic 2
Irregular ..... 26.

Of the 51 hearts that had no bruit on admission, on examination, 22 developed later a murmur in the mitral area. Of the mitral bruits 17 were pre-systolic, 48 were systolic. The preponderance of the murmurs met with in the mitral area over those met with in the aortic area is marked. Taking the murmurs met with in the mitral and aortic areas together, there are 67 hearts affected or a percentage of 44%. What is the origin of these murmurs? Many of those met with in the mitral area were functional, as shown by their disappearance after the patient had been in bed for a few days. They were probably the result of a dilatation of heart which is quite a common accompaniment of chorea, due perhaps to the general debility, and anaemia, which are associated with chorea, and perhaps to the action upon the heart muscle of the toxin causing the chorea. The majority of the murmurs are organic. Proof of this has been obtained

at/

at the post mortem examinations of fatal cases when all the signs of endocarditis affecting the valves have been obtained and these results were got even in cases where there was no murmur to be heard, during the course of the disease. The pulmonary murmurs were best heard over the 2nd and 3rd left interspaces and were merely functional, clearing up after the patient had been under treatment for a time. Dr Fisher[11] considers that many of these systolic murmurs heard in the pulmonary area are due to dilatation of the right side of the heart in the same way that some of the mitral systolic murmurs are due to dilatation of the left side. He refers to this dilatation as being due to the action of the toxin or micro-organism causing the chorea and mentions, as proof, that fatty degeneration of the heart muscle was present in a fatal case.

The <u>irregularity</u> of the heart tended to settle down as the child improved. Many of these irregular hearts were rapid at the same time, and both the irregularity and the rapidity increased while the child was being examined. In fact, there seemed to be a choreic state of the heart muscle present, although this has been regarded as impossible/

sible. However, Galdi[12] has lately accepted the existence of a chorea of the heart and drawn attention to certain signs which indicated this disease. These are variations in the diameter of the heart, especially when under stimuli, arrhythmia and a murmur.

Endocarditis and pericarditis are common in chorea. Amongst the inpatients 7 developed endocarditis, three of whom also suffered from pericarditis. A marked indrawing of the intercostal spaces was noticed in four cases, due to the effect of a previous pericarditis.

Are organic heart lesions due to chorea itself, or to some toxin or organism which causes both the chorea and the heart lesions? I think the latter is the case, and that this toxin or organism is, if not rheumatic in origin, at least closely allied to that of rheumatism. For proof there is

(1) The seasonal incidence of chorea with rheumatism;

(2) The history of rheumatism in the patient.

(3) The history of rheumatism in the family of the patient; and

(4) The fact that chorea is developed by patients while suffering from a rheumatic attack, as has been seen in some of these cases.

Again/

Again, we often meet cases of heart disease in children for which no reason can be given. There is no history of chorea, no rheumatism, no growing pains or other illness to be obtained. What are they due to? It is well known that the nervous system and cardiac system are more delicate in children than in adults, and so are more susceptible to any toxins or organisms existing in the blood. Is it not possible that we have in these children a toxin circulating in the blood, which is allied to rheumatism, if not truly rheumatic in character, and may not the virulence of the toxins be such that, though it may not affect the articulations, it may still be powerful enough to affect the delicate nervous system and the valves of the heart. Then if chorea be due to this toxin of what might be called a Latent Rheumatism, why does not every rheumatism develop chorea? Some do so, as is seen, but why it is not more often met with in rheumatic fever may be due to some idiosyncrasy on the part of the patient with regard to the nervous system; for it is seen that, where there is a nervous history as well as a rheumatic history, it is in cases where both are present that chorea appears to be most often met with. Further

proof of the relationship existing between chorea and rheumatism has been shown by the bacteriological researches of Drs Poynton and Paine[13]. They have isolated a diplococcus from rheumatism which, when injected into a rabbit, sets up a state of chorea in that animal analagous to the chorea seen in children. On killing the animal, the diplococci were found in the lymphatic sheaths of the vessels in the pia mater and in the endothelial cells of the blood capillaries, penetrating the cortex of the brain. Dr Poynton has also found diplococci in the cortex itself, and also on the mitral valve in a fatal case of chorea. Diplococci have also been found by Dana[14], Pianesi and others. The after history of chorea patients also points strongly to its rheumatic origin. Dr Batten[15] has found on investigating his cases that 60% had subsequently developed rheumatism sufficient proof of the rheumatic factor in the disease, though Osler[16] finding only 34% of his cases had developed rheumatism, while 51% had developed heart lesions, is inclined to think that the valvular disease is due to the chorea and that it is not altogether a rheumatic affection.

Chorea has been claimed by some observers

to/

to be a neurosis, but upon such evidence as the above it is difficult to deem it as such. Possibly in a few cases where the cause is given as fright and there is no rheumatic history obtainable, it may be considered as a neurosis.

The morbid anatomy of chorea requires a few words. The nature of the choreic movements, the fact that they stop when the patient is asleep, and recur when he or she is awake, and are often restricted to or more violent on one side than on another, points to an affection of the Rolandic area. This is not the only part of the brain affected however for the dulness and apathy, emotional disturbances and loss of speech which occur during the course of the disease make it appear as if the higher centres were also affected. Then the state of the reflexes points to implication of the spinal cord. Cases of fatal chorea are rare but the appearances that have been met with most often are small haemorrhages, occasional emboli, erosions and the perivascular spaces dilated and filled with round cells.(17) The pyramidal cells in the deeper layer of the cortex have been found swollen and turbid by Turner(18) and Dana(19) in/

in a case associated with lepto meningitis, found hyaline degeneration of the pyramidal cells. In the spinal cord the parts most affected were the root fibres and the anterior and lateral horns and the posterior columns - the anterior and lateral tracts were free. All this points to chorea being an infection of the nervous system especially if the age, seasonal incidence and gradations in an attack of chorea are taken into account rather than its being a neurosis.

Treatment of Chorea:

Chorea has the advantage, or disadvantage, of being one of those diseases of which the cause being unknown, lends itself to the experimental use of various drugs, in order to find a specific for it like quinine in malaria. Nearly every drug having a sedative, hypnotic, tonic or alternative effect has been tried. In the following account I will only refer to those drugs which were used in the treatment of these cases.

Arsenic in the form of the Liquor.Arsenicalis gave the best results. The patients were started on the hospital mixture which contained 2½ minims of/

of the drug to one ounce of water. This was given three times a day and each day the dose of arsenic was increased. This was done, not by increasing the amount of arsenic per ounce of the mixture, but by giving two, three,four, or five ounces of the mixture three times a day. By this means the arsenic was well diluted and very little gastric disturbances, puffy eyelids, or vomiting was got. The majority of the cases, who were treated in this way, improved quickly, about four ounces of this mixture (10 minims) three times a day bringing about the desired result. Only a very few cases required larger doses. In no case were more than 15 minims of the liquor arsenicalis given. When this dose was reached the patient was kept on it for several days, until the chorea improved. The dose was then gradually decreased until they were taking only 7½ minims of arsenic a day. Iron was then added to the mixture and the patient kept on the tonic for three weeks as an outpatient. When the arsenic seemed to disagree with the patient it was left off for a couple of days, then it was again started, but with a decreased dose. In two cases Herpes Zoster developed as a result of this drug, but Dr Logan[20] of Liverpool states that herpes/

herpes is not always due to the arsenic, but probably depends on some trophic influence of the affected nervous system. He mentions a case of herpes occurring in chorea in which arsenic was not given.

Trional was tried in four cases. The patients seemed better, but the improvement was much slower than in the case of arsenic. The dose given was 5 to 10 grains three times a day.

Ergot of Rye has been recommended by Dr Eustace Smith[21] in the treatment of chorea. He gives one drachm doses of the liquid extract every three or four hours, combining with it a drop of liq. strychninae in bad cases. This dose he recommends for a child of 8 years, and he continues the treatment for some time after the chorea has ceased. I have tried ergot in eight cases with apparently good results, as the following brief notes of two cases will show.

A.B., aet 17, chorea for three months. Had acute rheumatism a year ago. Pulmonary 2nd sound accentuated. No murmurs. Patient put on the following mixture:-

R.

R.

Ext.Ergot Liq. 3ss
Aq. Chloroformi 3ss

t.i.d.

at the end of the fifth day there was a marked improvement, though up to that time there had been none. The mixture was given for a fortnight by which time the chornic movements had stopped. The ergot was now discontinued and the patient put on a tonic containing iron and arsenic. He was discharged cured twenty-two days after admission.

C.R., aged 12. Chorea on two previous occasions. Growing pains complained of before the attack. Present illness began 3 weeks ago. The movements were general, but not violent. Cardiac dulness extended two finger breadths outside nipple line and there was a mitral diastolic murmur present. The patient was put on

R.

Ext. Ergot Liq. 3ss
Aq. ad 3ss
4 hourly.

As there was no improvement after being on the mixture for nine days, the drug was given every three hours and three days later there was seen marked improvement. The mixture was now given four/

four hourly for a week longer and by the end of the period the movements had almost disappeared. The patient was now given the ergot three times a day and twenty three days after admission he was discharged cured.

In three other cases in which ergot was tried it had no effect, but the patients improved when placed on the Mist. Arsenicalis. How ergot acts in these cases of chorea is doubtful. Dr Smith states that its action may be due to its sedative effect upon the nervous system supplying the brain and spinal cord. Perhaps its action, in constricting the blood vessels, allows of a less blood supply to the nervous system, and so there will be a less chance for the toxin, supposed to be present in the blood, of having its full effect upon the nervous system until the general health of the patient is so far improved as to negative itself the effect of this toxin.

Seeing how close the relationship is that exists between chorea and rheumatism it is not to be wondered at that the <u>salicylates</u> have been recommended for chorea. Good results have been obtained by many observers. Eighteen of these cases were/

were treated by sodium salicylate, the dose being 10 grains every four hours for a child of 8 years. I cannot say that the results obtained were better than those got when arsenic was given. Undoubtedly in the cases which developed rheumatic manifestations in the way of arthritis, tonsillitis, and endocarditis the salicylates did appear to be of benefit, but here again one wonders whether it was due to the salicylates that the chorea improved or to the fact that the rheumatism developed. It has been noticed that when a patient suffering from chorea has been attacked by any of the acute exanthemata that the chorea has stopped, so perhaps the rheumatism has had the same effect in these cases. However, it is advisable that when there is a definite history of growing pains or rheumatism a short time before the onset of the chorea salicylates ought to be tried. Perhaps the results obtained in these cases might have been better if larger doses as recommended by Dr Lees[22] had been given.

Aspirin, I have seen tried by Dr Williamson of Ancoats Hospital. He places all his chorea outpatients on 10 grains of this drug every four hours, and has obtained very good results. Less doses/

doses than those given, Dr Williamson thinks, are of little use.

Chloral and Bromides I tried in a few cases. The choreic movements were certainly improved, but the time for any benefit to take place was longer in duration. Besides the mixture of these drugs is unsuitable for cases unless they are under close supervision. The doses required are larger and chloral is moreover rather depressing. One case was treated by Chloral, grs.20, and Potassium Bromide, grs.30 every four hours without effect, and after three days these drugs had to be stopped as the movements were becoming more violent.

Various other drugs have also been recommended and successful results are obtained for each of them by their several advocates. Those drugs are strychnine, antipyrin, quinine, zinc, chloralamide, and valerian. I have not yet tried them. Before leaving the drug treatment I should like to mention one case of violent chorea which appeared to be cured by two hypodermic injections of morphia. The patient, a lad of 19 years, was admitted suffering from chorea. He was given Mist.Arsenicalis three times a day and the dose increased gradually until/

until he was taking 15 minims of arsenic three times a day. There was no improvement in his condition indeed he was much worse and slept but little. Chloralamide in 15 grain doses every four hours was given. After four doses had been taken and finding that he did not sleep he was given 20 grs. of chloral, combined with 30 grs. of potassium bromide every four hours. Finding no improvement and as feeding of the patient became difficult, this dose was given every three hours. There was still no improvement. The patient was becoming more violent in his movements and injuring himself slightly, although the bed had been padded and a special nurse was looking after him. As the patient could not go on much longer in this condition he was given a hypodermic injection of 3 minims of morphia (= $\frac{1}{4}$ grain) and after few minutes tossing about he slept for half an hour. On awaking, the movements were still violent and four hours later he was again given 5 minims of morphia (= 5/12 of a grain) making 2/3 of a grain altogether. He now dropped off into a quiet sleep, and on awaking seven hours later the movements were found to be almost gone. He was now put back on a mixture of iron and arsenic, given three times a day, and was discharged/

discharged cured ten weeks after admission. The only complication met with was the formation of an abscess in the tongue due to its being bitten through by a carious tooth.

The general treatment of chorea now requires a few words. In these cases the first thing done was to stop the patient's attendance at school or at work. The severer cases were admitted to the wards for treatment, for there is no doubt that the best results are got when the patient is completely kept at rest. This can only be done by keeping the patient in bed. The beds were isolated from the beds of the other patients by means of screens. This fulfilled two conditions in that it kept the patient quieter by shutting him off from the other patients, and it kept the other patients in the ward from taking notice of the movements of the child, thus preventing them from tormenting the patient or passing remarks on the patient's condition. This is important, for choreic patients are nervous and emotional and are very apt, when they know they are being watched by strangers, to become more choreic in their movements. At first the patient, especially in the case/

case of the younger children, were fed by the nurse until the movements had so far stopped that they could feed themselves. The diet was nourishing and abundant and every morning they were given a bath. The cardiac area was examined daily for murmurs and signs of pericarditis. The parents were only allowed to see the child once a week and in very bad cases this was not even allowed, as often it was found that the child was more irritable and choreic after the excitement caused by a visit from their parents. This general treatment was sufficient in many cases to cause an improvement in the patient's condition, even when drugs were not given. The average stay of the patients in hospital was about four weeks, and after being discharged, they were sent when possible to a convalescent home for another three or four weeks, and the parents advised about the chances of a relapse of the disease. Summing up the treatment in these cases the general treatment is the most important and of the drugs used, Arsenic, Salicylates and Ergot in the order named gave the best results. Looking back on these cases one cannot help thinking that as regards the drug treatment of chorea, we are working in the dark and will continue/

continue to do so until more definite knowledge of the pathology of this disease is made clear to us.

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