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A Case of Diabetes with notes on its Pathology and Treatment.

J. W. Walker.

1869.

S. A.

The following Case of Diabetes, which I had an opportunity of observing & recording, in the Autumn of 1868; occurred in the practice of Dr T J Walker of Peterborough; and appears to me worthy of notice, not only as presenting points of interest, bearing on the Pathology of the disease, but also as having been treated successfully, on a plan, differing but little, from that lately advocated by Dr Pavy, in a paper read at a meeting of the Clinical Society of London, and since criticised in the British Medical Journal by Dr Basham.

Henry Lee. age 63. formerly a Blacksmith, now a Beershopkeeper & Butcher. first seen August 24th Patient is a very stout man of florid complexion, and well marked Arthritic Diathesis. is about 5 ft 9 in in height. his present weight is 15 stone 10 lbs. he states his normal weight, when in full health, and working at his trade as a Blacksmith was 18 stone. He describes himself as having hitherto been a strong healthy man, but

has suffered a great deal, ever since he was a boy, from rheumatic pains in various parts of the body. Recollects being laid up for 16 weeks in the year 1838, for 12 weeks in 1839. and for 8 weeks in 1842. with attack of Sciatica. has not been fairly laid up, but has always been more a less subject to slight attacks of it since that time. has also been laid up several times, for the space of 10 days or a fortnight with Lumbago. Thirteen years ago, he was attacked with Rheumatism affecting especially the knees. Nine years ago he had an attack in which the wrists were the joints affected. These last are the only occasions on which his joints have been markedly affected. In 1852 he was an inmate of Guy's Hospital, for the removal of a large tumour in the Parotid region, the nature of the growth cannot now be ascertained.

About four months since, the rheumatic pains became more severe than usual. about a month later, he suffered from a succession of boils, coming out in crops on various parts of the body. and at this time he began to observe an

increase in the daily amount of his urine.
Simultaneously with the occurrence of this last
symptom, he found himself entirely relieved
from the rheumatic pains: to use his own
words." easier than he had been for ages".
For the last five or six weeks, the urine has passed
in very large quantities: he always fills his
Chamber utensil during the night, and according
to his own estimate, passes enough to fill a
pail during the day.
This symptom still (August 24th) continues,
The patient is frequently annoyed by the dribbling
away of the Urine, has an anxious expression, is
despondent, complains of great sense of weakness,
and of suffering excessive fatigue after very
slight exertion. says he is losing flesh rapidly,
complains of constant thirst, does not feel
remarkably hungry, but still takes his food
tolerably well. his mouth is always clammy,
with a disagreeable taste. The tongue is furred.
Pulse is weak. 100.
Urine is of a pale straw colour. Specific gravity 1039.
treated with Sulphate of Copper and Caustic Potash, it

gives the Characteristic brick dust precipitate. heated with Caustic Potash alone, it gives the bistre brown colour. A quart of this urine was afterwards slowly evaporated, and yielded several ounces of thick treacle.

The Patients diet up to the present time has presented no special peculiarity, he has always been a hearty feeder, but never a hard drinking man, his average quantity of beer per diem, when working at his trade, he states to have been two pints. But for the last seven years, his average has been only one pint a day.

Since May last, by the advice of a Medical Man, he has drunk still less beer, substituting a little home made wine. he has also lately taken a good deal of lemonade & ginger beer, to satisfy his craving thirst.

Treatment. There being no possibility for obtaining the Gluten bread, the diet recommended, was a partially restricted one. The object aimed at being, to provide the most digestible, & highly nutritious food, with as little of the sugar forming elements as was compatible with a palatable diet.

Accordingly patient was directed, to eat freely of beef & mutton, abstaining from pork and veal, which he had previously indulged in, to abstain from potatoes, but to take green vegetables occasionally to deny himself farinaceous puddings, to substitute brown bread (containing the whole grain) for white bread. as the brown bread would of course contain a less amount of starch, than the same weight of white bread would do. Sugar totally in any form was strictly forbidden, he was also ordered to drink milk, tea or coffee without sugar. and permission was given him to drink a small quantity of brandy & water if he liked to do so.

I may here say, that these rules were adopted and fairly carried out by Lee, during the whole time he was under treatment. His usual diet consisting of Beef or Mutton 2—2½ lbs. a moderate amount of brown bread, a pint of milk. & occasionally a few vegetables. he used to take a little weak brandy & water about every other day. The Medicinal treatment adopted, was the administration of Opium combined with Pepsine. he was ordered to take, A quarter of a grain of

of prime, and fifteen grains of Pepsine (Reynolds & Co) three times a day after meals. This treatment was steadily persevered in during the progress of the case. The only further measures that require notice, being, that on Sept 1st. in consequence of persistent diarrhœa, an astringent mixture of Tr: Opii mv ~~x~~ Acidi Sulph: dil: mxv was ordered. to be repeated after each liquid stool. This mixture was continued more or less through the month.
On Sept 18th A tonic containing Iron & Quinine was given. Six weeks later the patient was sent to Derbyshire for change of air.
With the above diet; and under the Opium and Pepsine treatment, The patient advanced steadily towards recovery.
The changes in the quantity of Urine are shown in the table (see back of this page)
At the end of November the secretion of Urine having been restored to its normal quantity for several weeks, and presenting no evidence of the presence of Sugar on the application of the usual tests. Medicinal treatment was discontinued, and the Patient was dismissed with the advice, that he should

Average daily quantity of Urine for week ending		Pints	Ounces
	Sept^r 1^st	7	10
	" 8^th	4	18
	" 15^th	5	7
	" 22^nd	5	3½
	" 29^th	3	12
	October 6^th	3	6
	" 13^th	3	6½
	" 20^th	3	7
	" 27^th	2	14
	November 4^th	2	7
	" 11	2	7
	" 18	2	7
	" 25	2	7

adhere as nearly as possible to the rules of diet previously given him. At this time though feeling well in health, and free from any symptom of Diabetes, he had already felt slight twinges of his old rheumatic pains. A few weeks after attendance on the patient had ceased, Dr Walker met him walking home from Manchester, on Jany 19th this year, the pain in his back & the Sciatica were so bad, as to induce him to again put himself under Medical treatment, at this time the Urine contained no sugar. Hot baths Turpentine liniments, opiates and Alkaline remedies gave some relief, but it was not till after the adoption of the Pepsine & opium powders, which had been administered during the ~~[illegible]~~ existence of the Diabetes, that the patient sufficiently recovered to resume light work.

April 26th The patient was seen by me to day, he states that he now passes rather less water than he used to before his illness, which he attributes to the fact that he drinks less, not taking more than one glass of beer in a week, & drinking but little tea Pints or other fluid. He has for about a month, resumed his usual diet, only

taking rather less potatoes, sugar & bread than he was formerly accustomed to take. He does not attempt hard work but is able to go about in his spring cart, and follow the business of a Higgler. His weight remains pretty constant at about 16 Stone. His urine presents no trace of sugar. is of Sp: gr 1029 the high density being probably accounted for by the limited consumption of diluent drinks.

The patient has never been free from Sciatica in his left leg since the cessation of the symptoms of diabetes. and he has again become liable to all his old rheumatic pains.

This is the history of the Case from the time I first observed it, to the present date.

I am aware that these notes taken originally, merely as a guide to the treatment of the Case, are more meagre than they should be for the purpose to which I now apply them, but they are sufficient to indicate clearly

1st The constitution & diathesis of the patient, and his special liability to rheumatic affections.

2nd That this was a well marked case of Diabetes Mellitus. progressing in an outward direction until treatment was commenced.

3rd Not under treatment, a cure has taken place.
4th The remarkable vicarious relation between the
Diabetic symptoms, and the muscular & neuralgic
pains under which the patient has laboured.
The last point is that which leads me to regard this
case as one of special interest. And it is the fact of this
opposite connection, or antagonism, between the two diseases
which may possibly, I trust, throw some little light on
the mysterious pathology of Diabetes. That I am right in
applying the epithet "Mysterious" must I think be acknowledged
when in one of the latest Textbooks on Medicine we find the
"Author saying" "It follows therefore from the remarkable history"
"of this affection, that the Student ought to postpone coming to"
"any decision on the subject, till he is in possession of further"
"evidence. It seems necessary to conclude, however disappointing"
"may be the confession, that the Pathology of Diabetes still remains"
"a problem to be solved". Dr Tanner 1865. And again
in Dr Beales book on "Kidney diseases urinary deposits &c"
published this year, I find the following sentence
"Up to the present time, we are quite ignorant, of"
"the reason why Sugar is not present in healthy urine,"
"and what conditions lead to the excretion of so large"
"a quantity as we meet with in Diabetes."

And this Lecture follows after several pages discussing the nature, of the amyloid substance of the liver, and of the changes which it undergoes in Health and disease. The General tenor of which seems to upset all that Dr Peay and more recent Pathologists have written on this subject, and to confirm the views published by Bernard, some — years ago. To the Student, this Malady which is characterised by so remarkable a change in one of the secretions of the body, would appear to afford a field, in which the Application of Organic Chemistry to the study of Pathology, should specially triumph, but it is evident from the differences of opinion which still exist, among writers on this subject, that the difficult problem is still far from being solved. This being the case, any fact or hint of a fact concerning the disease may prove of value, and I am not aware, that as yet, attention has been directed to the relationship existing between the morbid poison of rheumatism, and the sources of sugar in diabetes, which is, I think, indicated in the above case. My own knowledge is far too insufficient to enable me to explain this relationship. I can only indicate, in what direction this fact seems to me to tend.

The first question which requires considering, is." What was the morbid element in the patients constitution, which rendered him liable, when not diabetic, to the pains of which he complained, without quoting from the various Authorities on the subject, I assume that there is sufficient evidence, that the blood contains an excess of Lactic Acid.

Now although Dr Pavy has shown that the presence of an excess of Acid in the blood produces diabetes: I do not imagine that there was any such relation, in this case, between the morbid condition producing the rheumatic pains and the diabetes, as that of cause and effect: but what I think is certainly proved, by this case at least: is, that the Morbid process whatever it may be, that gives rise to Diabetes, is incompatible with the existence of an excess of Lactic Acid in the blood. But when with the view of ascertaining the bearing of this fact upon the pathology of diabetes, I seek for information as to the nature of the Morbid process, I only meet with conflicting theories and disputed facts.

The important facts bearing upon the sources of the sugar in diabetes, which are, I believe, undisputed, are

1st. That in this disease, there is an abnormal quantity of sugar and water, excreted from the body, and no one

as far as I am aware, disputes that the amount of urea secreted is greater than can be accounted for by the amount of urea & urea forming ingesta consumed.

2nd. that in diabetes, although there is frequently an increased consumption of food, there is always in the active state of the disease, progressive emaciation.

3rd. It is I believe an undisputed fact, that there is a close connexion between lesions of the Nervous system and diabetes

4th. It is now acknowledged by all, that there exists in the liver a large quantity of a substance, known as the "Amyloid substance" which is convertible into urea under favourable conditions.

5th. of all the Physiological & Pathological points connected with diabetes, that which was affirmed as a fact by Bernard and denied by Roy is the most important. viz, that in health the Amyloid matter is in the liver, converted into urea, which urea is afterwards destroyed in the course of the circulation, more especially in the lungs. It is in the unsettled condition of this question, that the main difficulty of advancing towards a knowledge of the true pathology of diabetes lies, and to the Student it is almost a matter of impossibility, to see on which

side the weight of evidence lies.
The experiments of Bernard, leading to his discovery of the Amyloid Matter, led him to form conclusions on the Glycogenic function of the liver, which the careful and elaborate experiments made by Dr Pavy seem to entirely upset: while again the experiments of Hoppe seem to confirm Bernard, and confound Pavy, who again is supported by McDonnell & others.
The first point requiring to be settled, is the normal transformation of the Amyloid matter of the liver, whether it is, in accordance with Bernard's views & experiments converted into sugar in the liver, and destroyed in the lungs. or whether as supposed by Pavy it is converted into fatty matter, or whether it combines with Nitrogen and is formed into a Protein Compound, as supposed by Dr McDonnell.
If it is believed that normally the Amyloid substance is converted into sugar, the natural conclusion as to the source of the sugar in diabetes, will be that its normal destruction is interfered with. If on the other hand the Amyloid substance, is not normally converted into sugar, then the morbid process in diabetes must consist of an excessive formation of sugar.

"that has turned sour. Now I can see no reason, "
"although I can bring forward no actual proof, "
"in support of it, why the changes going on in the "
"blood in its circuit through the body, may not act "
"in the same way as the changes of decomposition, and "
"occasion a slow production of lactic acid, from the "
"trace of sugar that I have mentioned, as being found "
"in every part of the circulation. Whatever however "
"may occur of this kind, must be of an exceedingly "
"trifling nature, for the disappearance of sugar is not "
"to be detected in any particular portion of the system "
"by a difference in the behaviour of the blood."

Now it appears to me, that the case which has led me to express my thoughts on this very difficult subject, affords the proof which Dr Pavy wants, for although we cannot directly trace sugar into the blood, and watch its conversion into lactic acid, we find those points which are our physiological test of the presence of lactic acid, disappearing where the sugar disappears unchanged, and again where the sugar disappears, the evidence of lactic acid in the blood reappears.

So far then this case would tend to show, that one source of the sugar appreciable in the blood, and

in the urine, is the arrest of that process which results in the formation of lactic acid. Now although in this case there was probably an excess of that constituent in the body from which lactic Acid is derived, yet he cannot conceive that the disease consisted merely in an arrest of the lactic Acid fermentation without any increase in the amount of sugar.

The fact which I have ~~mentioned, may~~ enable drawn attention to in this case, coupled with others, may enable those, competent to pronounce judgement on points of pathology, to say decidedly that diabetes is not a disease characterised by excessive production of sugar, but by arrested destruction of sugar.

I feel that it would be only foolish presumption on my part, to draw any further conclusions, from the case in question, with regard to the source of the sugar in diabetes, beyond what may be stated in the following propositions.

1st That, as supposed by Dr Roy, there is probably in the circulation, a constant slow production of lactic Acid, from the traces of sugar present in the circulation.

2nd That, in certain systems, or certain conditions of the system, as in persons of Arthritic diathesis or sanguine temperament (who I believe are, on all hands, allowed

to be especially the victims of diabetes) this production of lactic acid is excessive, and gives rise to various symptoms. That in diabetes, these symptoms indicative of an excess of lactic Acid cease.

Therefore one source of the sugar in the urine in diabetes, is the arrest of that process of destruction, analogous to the lactic acid fermentation, which goes on in the system, to a slight extent in health. and in an excessive degree in certain morbid states. At the commencement of these notes, I stated that this case appeared to me of interest, as regards its treatment as well as its pathology. While acknowledging that the case occurred in a patient, whose age and diathesis might favourably affect the prognosis, I still think that, taking the history of the case, and the steady advance of the symptoms, up to the time when he first put himself under medical treatment, the cure (which so far appears permanent). may be fairly attributed, to the treatment adopted. The restriction of diet, may, or may not have had much to do, with the satisfactory progress of the case, At all events the restriction was so limited that it is impossible to attribute the cure entirely to it. We must therefore

look to the Medical treatment. which was simply the regular administration of Opium, in combination with Pepsine. The latter remedy was first recommended, under the impression that the chain of symptoms coinciding with the appearance of an excess of sugar in the urine depended on faulty gastric and duodenal digestion. The tendency of modern ideas is certainly against this theory, but the results of cases treated by Bennet were sufficiently encouraging to warrant a further trial of this remedy, the more so as it is stated that many of the failures of Pepsine are due to an inefficient preparation having been used. The important remedy, probably was the opium, and to the persevering & steady use of this drug, I think the cure must be attributed. The dose given at first was not a large one, and as a decided improvement in the patients condition took place, as soon as the treatment indicated in the notes, was adopted, and steadily continued. the dose was never increased.

Dr Bosham's explanation of the source of the cure in Dr Pavy's case, (vide Medical Journal April 1869.) viz. that it depended on the alkaline remedies given, cannot apply here, as no alkali of any

kind was given to the patient, until the symptoms of diabetes had disappeared for some considerable time. One of the points in the pathology of diabetes on which, I have assumed all are agreed, is, its connection with some lesion of the Nervous system. it is therefore very natural, that the remedy most relied on, should be one, which like Opium has such a powerful action upon this system.
Sir Thomas Watson, writing on Diabetes in 1858. says "Opium is a treasure to us in this disorder". Though I must add, that he goes on to say that while he observe the favourable changes produced by its use, we are not to imagine, it is curing the disease.
He rather advocates the use of Creasote, which he believes "by its well known preservative property, checks the conversion of food into sugar."!
Opium, may by its action on the Cerebrospinal system, contribute to the relief & comfort of the patient: but its curative influence must be exerted through the Sympathetic, its powerful influence on which is shown by its effect on the circulation, the Secretions, and the iris.
It is a curious fact that contraction of the pupil

which opium probably causes by its paralysing influence on the sympathetic) is also caused by those injuries, of the ~~cerebral~~ filaments, and of the superior cervical ganglion, which Dr Pavy inflicted, and found to produce a saccharine state of the urine in animals.

I must now apologise, both, for the crude form in which I have presented these remarks, and also for my apparent presumption in selecting so difficult a subject as diabetes, or else an unkind critic might quote "Fools rush in where &c"
Had I had any option in the matter, I should have much preferred deferring any remarks, until I had had greater experience both of this and other diseases. But being compelled by the Statutes, to send in a paper, at the present time, while I am only just completing my Curriculum; this case suggested itself to me, it having made some impression on me, ~~both~~ from the patient having been under my charge, and its being the ~~only~~ one, out of the very few cases of diabetes that I have yet seen, which gave the most decidedly satisfactory result.

J. W. Walker. May. 1869.