A LECTURE ON NON-DIABETIC GLYCOSURIA.

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Side by side with the all-important subject of diabetes it is necessary to study the occurrence of non-diabetic glycosuria, so that we may have as much knowledge as possible of the conditions under which it may be met with, and be prepared to give a satisfactory answer to the practical questions so frequently arising respecting the diagnostic and prognostic value of the presence of sugar in the urine.

Every practitioner who follows the commendable habit of making a routine examination of the urine of each new case must find from time to time sugar indicated by the ordinary copper test. The frequency with which this is encountered is very differently stated by different persons, but in my experience it is certainly not anything like so common as the presence of albuminuria. Some years ago when engaged in out-patient work I tested systematically the urine of each patient with Fehling's solution, with the result that the number of casual instances in which traces of sugar appeared to be present was so small and revealed so little of interest, that I gave it up. It is in my private chamber practice that I have seen most of these cases, but in looking over my books for the last fifteen years I have only managed to collect some sixty-nine examples of non-diabetic urine which reduced copper, and of these in eleven cases the reduction was not due to sugar. When it is remembered that I have for some years devoted special attention to urinary diseases, and have had many diabetics under my care, and that consequently I am liable to have sent to me people whose urine has shown indications of sugar, I do not think the number at all large.

PSEUDO-GLYCOSURIA.

The method of examination invariably used by me is to boil a few drops of urine with about a drachm of Fehling's solution previously ascertained to be not liable to spontaneous reduction. Any change from blue to green or still more a green or yellow precipitate indicates more or less complete reduction and calls for further investigation. It is well known that the reduction of copper is not by itself a certain proof of the presence of sugar, as there are many other reducing agents occasionally present which may give this reaction. Of these uric acid, creatin, and creatinin are normally present in the urine, but not in sufficient quantities to cause reduction unless the urine is concentrated. Besides these, reduction may be caused by such abnormal substances as glycuronic acid, chloroform, chloral, salicylic acid, etc., which when present cause a very well marked precipitate of suboxide of copper. Whenever we are confronted by the unexpected indication of the presence of sugar, we are therefore bound to attempt by some confirmatory test to settle definitely the question whether the reducing substance present is sugar or not. The most satisfactory proof of the presence of sugar undoubtedly is the production of carbonic acid gas by fermentation with yeast, but the fermentation of minute quantities of sugar is attended by fallacies, because yeast frequently contains traces of sugar sufficient to give a bubble of gas in the receiver.

No doubt this may be removed by carefully washing the yeast, but even then the process takes several hours, and it is often important to answer the question at once; another plan is the production of glucosazone crystals after the method of von Jaksch, but even this takes a good deal of time and requires careful manipulation. I have for some years used the method recommended by the late Sir William Roberts of filtering a few drachms of the urine repeatedly, that is, seven or eight times, through animal charcoal in a small filter. This can be very easily done, and only takes about ten minutes. The filtration removes all other reducing substances except sugar, while the reduction if due to sugar becomes even better marked than before. I have followed this plan for the last two or three years in all doubtful cases, and have every reason to express myself as satisfied with it.

Examples of this pseudo-glycosuria are not uncommon, and as a class it is by no means unimportant. For instance, wherever a presumably healthy person is undergoing examination for life insurance or for admission to the public service, it is right and proper to examine the urine for sugar; if reduction occurs its significance should be determined at once, and this can be done by the above-described method very readily.

ALIMENTARY OR PHYSIOLOGICAL GLYCOSURIA.

It is well known that the urine in health contains minute traces of sugar, but not sufficient to reveal its presence by the ordinary method of testing. Apart from this small quantity it appears to be the rule that healthy persons utilise in the body all the sugar taken either as food or drink, but a number of recent experiments have shown that this only holds good when the quantity of sugar remains within certain limits which we may call normal. While the capacity for assimilating sugar is by no means fixed, it has been shown that in all persons it is possible to produce glycosuria by administering a sufficient dose of grape sugar, this dose varying in different individuals between 300 and 500 grams of syrup of grape sugar.

It has been suggested by some observers that those persons who manifest glycosuria after a relatively small dose of sugar may have a tendency to become diabetic, but hitherto there has been no sufficient evidence in favour of this proposition. It is, however, certain that some persons do become glycosuric after eating or drinking an unusual but nevertheless not very excessive quantity of sugar as is illustrated by the following example:

CASE I.—A chartered accountant, married, aged 36, was sent to me to be examined for life insurance on October 12th, 1891. He weighed 9 st. 7 lbs., and measured 5 ft. 5 in. He was slightly developed, but fairly nourished, and his physical signs were normal. He said he had had influenza in the previous May, but could recollect no other illness. I found his urine loaded with sugar, but free from albumen. Three days later he sent me a specimen of twenty-four hours' urine, which amounted to 45 ounces. It was acid, clear, pale amber coloured, and did not reduce copper. On October 16th he passed urine in my presence which was quite free from sugar. He explained that before coming to see me on the first day he had taken a very sweet cup of coffee and had eaten a bath bun. On the evening after seeing me he went on to a neighbouring town, where he had relations, and where his urine was examined by a medical friend who confirmed my statement that it contained sugar.

Another case of transient glycosuria was also an applicant for life insurance, but there was no evidence that he had taken more than an usual quantity of sugar, and therefore I am not certain that it ought to be included under this head. The details are as follows:

CASE II.—A gentleman, aged 53, was sent to me on December 15th, 1891, to be examined for life insurance. He believed himself to be in perfectly good health, except that he had a slight cold in his head. He had never had any serious illness or gout, nor was there any history of gout, rheumatism, or diabetes in his family. He weighed 10 st. 3 lbs., and presented no evidence of any disease except that his urine contained sugar in considerable quantities. The same evening his urine was examined by his own doctor, who confirmed the presence of sugar. I examined the urine again two days later, and found it free from sugar, but another specimen contained sugar. He was dieted, and on January 5th his urine was found to be free from sugar. He was allowed to eat potatoes, and on January 27th his urine was 1022, and contained no sugar, while his weight was 10 st. 4 lbs.

Another case, which is much more remarkable than the last, came under my notice as an applicant for life insurance, but I am quite unable to know how to classify it unless we assume it to be one in which alimentary glycosuria is habitual.

CASE III.—A. M., aged 32, metal roller, was sent to me on January 6th, 1887, to be examined for life insurance. He was a stoutly-built man, weighing 12 st., and measuring 5 ft. 6 in. He considered himself to be in perfectly good health, and presented no indication of any disease except that his urine was loaded with sugar, and of specific gravity 1029. On July 18th he was re-examined; the specific gravity of his urine was

1026, and it was still loaded with sugar. The presence of sugar was proved by fermentation. On May 23rd, 1888, he weighed 12 st.; his urine was: specific gravity 1023, and contained sugar. On February 16th, 1895, he weighed 12 st. 9 lbs.; his urine still contained sugar, but he considered himself to be in perfectly good health. I have recently made inquiries of his family medical attendant, and hear that he is in good health, but I have not been able to examine another specimen of water.

If this glycosuria is to be regarded as pathological, it is strange that it should have lasted so long without having produced any obvious effect upon the patient's health. It differs from all my other cases of non-diabetic glycosuria by its constancy as well as by its duration. The quantity of sugar was always sufficient to cause a marked reduction, but I have only one note of the actual amount, which was on February 16th, 1895, when it was 1.2 per cent. As will be seen later on, I attribute many cases of glycosuria to alcoholism; but although A. M. was not above suspicion there was no evidence that he was intemperate, and certainly when I first knew him he was a picture of manly strength. I suspect he does not care to be reminded that there is anything wrong with him, and so long as he keeps well prefers to have nothing to do with doctors, as he has taken no notice of my recent invitation to him to call upon me again.

I have notes of two other life insurance cases where the subjects believed themselves to be in perfectly good health, and presented no other evidences of disease except the presence of glycosuria.

CASE IV.—A gentleman, aged 29, consulted me on May 6th, 1889, because he had been declined by the Royal Insurance Company. He considered himself to be in perfectly good health, and could remember no illness since he had typhoid fever as a boy at school. He had never met with any accident, nor was there any tendency to consumption or diabetes in his family. His father, who was living, was 73 years of age, and suffered from gout. Mr. L. weighed 9 st. 6 lbs., and measured 5 ft. 8½ in., his chest measurement being 35½ inches. He was a total abstainer; his physical signs were normal; the urine amber, clear, 1028, no albumen or sugar. He sent me a specimen of his urine two days later, which contained sugar; the quantity for twenty-four hours measured 40 ozs. It was pale, clear, acid, 1022, and contained sugar, but no albumen. In the following October, after he had been taking modified diet for some months, his urine still contained a trace of sugar, but there had been no polyuria or thirst.

I have not been able to learn the subsequent history of the case.

CASE V.—A gentleman, aged 43, was examined by me early in June, 1887, for life insurance, and was rejected on the ground that he had sugar in his urine. He weighed 13 st. 9 lbs., and measured 5 ft. 7½ inches. He was in the habit of drinking about three glasses of beer daily. His physical signs were normal; urine 45 to 60 ozs., specific gravity 1028, acid, amber, a little sugar, a haze of albumen. He came back to see me on November 11th, when he had gained 3 lbs. in weight, and was passing 45 to 50 ounces of urine daily, which contained a faint trace of sugar. During the interval he had made no alteration in his diet.

I unfortunately omitted to keep the addresses of either of these patients, and so have been unable to communicate with them. It is quite possible that they ultimately became diabetic, and my only reason for putting them in this group is that they believed themselves to be in good health, and presented no symptoms or signs apart from the state of the urine to suggest that there was anything the matter with them.

PATHOLOGICAL GLYCOSURIA.

In all my other cases the patients have been ill. They had sought medical advice, and the sugar was found in the course of a medical examination made for diagnostic purposes. I have tried to classify these cases so as to reduce them to some sort of order. By far the largest number—22—come under the head of the alimentary system, and these again may be subdivided according to their most obvious phenomena, as chronic gastritis 9, alcoholism 7, chronic hepatitis 5, and biliary colic 1. The next most numerous group is the diathetic, which includes 8 cases; gout 3, muscular rheumatism 3, uric acid calculus 1, oxalate calculus 1.

The nervous system claims 7, of which 2 followed cerebral hæmorrhage, and 5 were associated with neurasthenia. Infective processes were responsible for 8 cases, after influenza 2, boils and carbuncles 3, abscess 2, ulcers (?) 1. Falls and injuries account for 2, senile decay 2, cancer of rectum 1, and lactation 1. The last case illustrates how very necessary it is that attention should be drawn to the occurrence of non-diabetic glycosuria in order to avoid very serious mistakes.

CASE VI.—A married woman, aged 29, was sent to me on October 23rd, 1896, by her own doctor as a case of diabetes mellitus. She had been ailing since her baby was born, and had become weak and easily tired. There was no definite history of loss of weight, and although she said she passed water frequently, it had not been measured, and she had never suffered from thirst. When the urine was collected, it was found to measure only 50 ounces in the twenty-four hours. It was pale, yellow, acid, specific gravity 1022, and quite free from sugar. In response to my inquiry, her husband writes under the date February 20th of this year to say that there has been no return of the symptoms.

The case was unfortunate, as the medical attendant had committed himself to a serious prognosis and had insisted upon the necessity for the adoption of a strict diabetic diet. He wrote me some letters, which I hope did something to relieve the annoyance he no doubt felt.

Many of the groups which I have enumerated are very well known; therefore I do not propose to take up your time by attempting to illustrate all of them, so that I may be able to devote more time to those which are less familiar.

ALCOHOLIC GLYCOSURIA.

I desire especially to draw attention to alcoholism as a cause of glycosuria. This may be intermittent or constant, and perhaps in this respect it depends upon the intermittence or constancy of the cause. The following case is very well marked, and shows that when the cause is removed the effect ceases:

CASE VII.—A manager of a public house, aged 36, consulted me in March, 1896, for morning sickness and loss of appetite. He admitted taking alcohol in considerable quantities, and said that he had been ill for two or three years, but had been much worse lately. He had recently lost 19 lbs. in weight, and his present weight was 11 st. 9 lbs. He was in a very shaky condition, and appeared to be very near delirium tremens. His urine was turbid, acid, specific gravity 1028, loaded with sugar, but free from albumen. He was advised to become a total abstainer, and his gastritis was treated by the usual remedies. He returned a week later and reported himself as being very much better, but a little sugar still remained. On March 31st his urine was free from sugar, specific gravity 1014; he had gained 5 lbs. in weight, and said that he felt "a wonderful lot better."

Besides the cases in which an alcoholic history was forthcoming were 5 cases in which the liver was much enlarged and which had been grouped under the title of chronic hepatitis. One of the cases of chronic hepatitis was malarial, but the other 4 were people who had always lived in this country and whose cases presented nothing to throw any light upon the processes which had caused enlargement of the liver. Undoubtedly the abuse of alcohol is in this country the most common cause of such enlargement, and it would not be unfair to suspect that some at least of these cases should by rights be included amongst the alcoholic group.

The same remarks apply to at least a certain number of the cases which are classified under the heading of gastritis, so that I do not think there can be any doubt that we may attribute to alcohol by far the largest share in the production of these cases of glycosuria. In one of the cases which I have classed under alcoholism it is probable there was cirrhosis of the liver, as the liver dulness was absent. In another case the patient had been known to me for some years, and I had often warned him to give up taking spirits, but he was an uneducated man who had been successful in business, and was totally destitute of any taste or capacity for employing his leisure time except by smoking or drinking or playing billiards. He was 60 years of age, and the sugar was found in 1896 when he was undergoing an examination preparatory to increasing his life insurance. The reduction was quite slight,

but the urine fermented and formed glucosazone crystals. I saw his death in the papers a few months ago.

Of the other cases two were sufferers from habitual intemperance, in both of whom the amount of sugar was quite small. Another had been intemperate and still takes a free allowance of alcohol. In this last case the liver is enlarged and the amount of sugar considerable. It is nearly two years ago since I first saw this case and the sugar still persists. He has recently promised to abstain completely, and I hope when I publish these notes to be able to record the result. As this case is of some interest I subjoin an extract.

CASE VIII.—A gentleman, aged 40, consulted me on the 5th of April, 1898, on account of having accidentally discovered in the previous January that his urine contained sugar. He weighed 14 st. 12 lbs., and had never been heavier. He did not complain of polyuria or thirst, and on physical examination his liver was found to come down half way to the level of the umbilicus. He said that at one time he had taken alcohol in excess and still took a fair amount. His urine was sp. gr. 1026, no albumen, sugar 1.6 per cent. When seen again on March 1st of this year he weighed 14 st. 8 lbs., and said he had no polyuria or thirst and he considered himself in good health. His liver was about the same size and his tongue was clean. He was in the habit of taking one or two glasses of whisky and the same quantity of beer daily. He took no sugar, and very little potatoes but made no restriction in the quantity of bread eaten. His urine was sp. gr. 1024, no albumen, sugar 2.5 per cent. He promised to abstain from all alcohol, but was required to make no other alteration in his diet.

Since I have been engaged in preparing this lecture I have had two fresh examples of alcoholic glycosuria brought under my notice.

CASE IX.—One of these was a mining engineer, aged 39, who had forfeited his position and driven his wife away from him by his intemperate habits. He came to see me at the hospital on account of depression and suicidal impulses. I thought this was just such a case as I should expect to present glycosuria. He said there had been neither thirst nor polyuria nor loss of weight. The urine when examined proved to reduce Fehling abundantly and continued to do so after careful filtering through animal charcoal; I have admitted the case into hospital in order to have him under observation, with the result that the sugar has completely disappeared, and he has lost all his disagreeable feelings. The urine passed on admission formed glucosazone crystals and by Fehling's method contained 0.6 per cent. of sugar.

The other case is one on which there might be some difference of opinion, as it was sent to me by a medical practitioner as a case of diabetes.

CASE X.—The patient was a commercial traveller, aged 57, who said that he was feeling very well, but that his doctor desired him to see me, as since August last he had been suffering from glycosuria. When he first came under medical observation he was suffering from irregular action of the heart and great mental depression. His urine then measured 70 ounces, and contained 4 per cent. of sugar and one-eighth of a column of albumen. When I saw him his pulse intermitted every third or fourth beat, and was going at the rate of about 60 a minute. His urine was about 60 ounces daily, specific gravity 1012, sugar 1.5 per cent., albumen a dense cloud. There was no thirst. His heart was enlarged, the area of dulness extending at least an inch to the left of the vertical nipple line. There was no murmur. He weighed 13 st., but said that formerly he had been as much as 14 st. 7 lbs.

I am anxious that this patient should try the effect of total abstinence, and he has promised to do so.

The form of alcohol which was taken in these cases has been, I believe, invariably whisky, but in talking over this subject with my friend Mr. Barling he related to me a very good case in point which had come under his own notice where the patient drank beer.

HEPATIC GLYCOOSURIA.

Although some of my cases of alcoholic glycosuria have had evidence of chronic hepatitis (cirrhosis) and some of the cases classified as hepatic glycosuria may, as already suggested, really be alcoholic there were others which seemed to me to be above suspicion, of which the following is an example:

CASE XI.—This was a solicitor, aged 49, a bachelor, an exceedingly fidgety little man, who consulted me on November 19th, 1895, complaining of flatulence and of being easily tired. He attributed his illness to a fall from his horse in May, 1894, but dated the commencement of his symptoms from the autumn of that year. In January, 1895, sugar was discovered in his urine, for which he was put upon diabetic diet, but as he suffered greatly from giddiness he went to consult Dr. Buzzard. Dr. Buzzard regarded him as a case of tabes with symptomatic glycosuria, and in favour of this diagnosis were the following facts: He was not quite steady in Romberg's position; the knee-jerks were gone, and there were some neuralgic pains in his legs. The pupil reflex was normal. He complained of morning sickness, and I found that his liver extended downwards to the level of a line drawn about an inch above his umbilicus. The specific gravity of his urine was 1030, acid, contained a moderate quantity of sugar but no albumen. He was intimately known to a medical friend, who sent him to me, and neither his appearance nor his manner, nor what I could judge of his character suggested the smallest suspicion of intemperance. On strict diet the sugar nearly disappeared and he improved much, but his indigestion returned. When I saw him two years later he had gained 5 lbs., his urine reduced copper very slightly, but he was complaining of indigestion.

In answer to my inquiries I learnt that his urine is now at the present time quite free from sugar, and he still suffers from indigestion and from neuralgic pains in the legs, but the tabetic symptoms have made no progress. I must confess that I never had a suspicion that alcohol played any part in the causation of this case until I was preparing this lecture. But on reading over my notes I was puzzled what to answer when I asked myself what grounds I had for exonerating this patient from the suspicion which undoubtedly extends to all patients suffering from glycosuria, gastritis, and enlarged liver.

I felt I had no answer except my own impression, so I determined to write to an intimate friend of the patient, who is also a medical practitioner. To my surprise he replied: "I am inclined to think your surmise as to — is correct. I do not mean to suggest for one moment that he ever takes too much, but he lives a somewhat solitary life, and dwells upon his ailments, and I fancy often takes little nips."

On the other hand, here is a case of which I had great doubts:

CASE XII.—A manufacturer, aged 40, was sent to me in November, 1894, to be examined for life insurance, and was rejected on account of the presence of albumen and sugar in his urine. On December 6th following he consulted me about his health. He was a pale flabby man, measuring 5 ft. 10 in., weighing 12 st. 10 lbs., who said he often suffered from "bilious attacks." He had never had any serious illness. There was some catarrhal sounds over the lungs, and the heart's apex was in the vertical nipple line, but I could find nothing else the matter with him, and on that occasion the urine was free from albumen and sugar. His urine when collected for twenty-four hours measured 50 ozs., and contained 1 per cent. of sugar, no albumen. Under treatment the sugar disappeared and the albumen did not return. I had opportunities of verifying the absence of sugar and albumen in April, 1895, and in October, 1897. On January 1st last he returned complaining of sickness, sleeplessness, and cough. He looked very wretched. His tongue was furred; his liver extended an inch and a half below the costal margin, and his urine contained both sugar and albumen. He was very weak upon his legs; his knee-jerks were absent, and there was considerable tenderness of the calf muscles. He admitted taking alcohol pretty freely lately, but said that he did so because he was unable to eat. I could not obtain from him or his friends any admission of habitual excess, but in view of my recent experience the symptoms and physical signs were sufficiently significant to induce me to write to his doctor and tell him my suspicions. A few weeks later, as I was anxious to know the progress of the case, I wrote to the gentleman's doctor, and got back a letter to say that the patient was much offended with me for having suggested alcohol as the cause of his symptoms, that he insisted on calling in another physician, who agreed with the writer of the letter in his view of the case—namely, that it was a case of

"glycosuric neuritis," and that he did not suppose the patient would be willing to let me have any water for examination. I see by the papers that he died on March 22nd.

If in the above cases the etiology of the hepatitis is doubtful, the following example of glycosuria occurring after malarial hepatitis and hepatic abscess will be accepted without hesitation.

CASE XIII.—A surgeon-captain in the I.M.S., aged 31, consulted me in March, 1895, for attacks of fever accompanied by hepatic pain and sometimes followed by jaundice. He had had seven years' service in India, and had suffered from intermittent and remittent malarial fever in Burmah. In 1894 he developed a hepatic abscess, which was eventually opened and drained. He was sent home and the abscess wound had healed, but he had remained subject to these febrile attacks. He looked worn and lean, and weighed 10 st. 11 lbs. There was no ascites or oedema; the liver was not enlarged or tender; spleen normal; bowels confined; heart sounds normal; pulse 72; urine phosphatic, no albumen or sugar. During 1895 his attacks became less frequent and less severe, and I saw him occasionally during the next three years. In February, 1898, his urine was found to contain 15 per cent. of sugar; its specific gravity was 1028, and it was free from albumen. He was 2 lbs. lighter than he had been three years before. In reply to my inquiry as to the progress of this patient, I have heard from him that under diet and exercise he has kept in capital health, but he is 6 or 7 lbs. lighter than he was. He believes the sugar was found when he went up to be examined at his medical board, which was just after my examination. It subsequently disappeared and he believes had not returned, but I have not been able to get any more definite information upon this head.

I have had another case almost exactly similar of a patient suffering from febrile attacks with pain over the liver after the healing of a tropical hepatic abscess, but I have not been able to find any sugar in his urine up to the present.

I have several times observed the association between gall stones and glycosuria, but during attacks of biliary colic the glycosuria generally disappears, and in a case which is mentioned in my *Lectures on Renal and Urinary Diseases* (p. 256) it is stated that after the disappearance of the jaundice the sugar did not return. I did not see this gentleman again, but I know that he lived for many years afterwards, and died at an advanced age two or three years ago.

The case which I have found among my recent notes is not a very striking one.

CASE XIV.—The patient, a lady aged 58, consulted me on March 1st, 1895, for attacks of colicky pain accompanied by vomiting, and followed by jaundice with coffee-like urine, to which she had been subject for the last six months. A distended gall bladder could be felt below the costal margin. No examination of the urine was made on that occasion, but a fortnight later, there having been no attack during the interval, the urine contained a little sugar, but the distended gall bladder could no longer be perceived.

We must not forget that Hirschfeld has described cases of diabetes which were preceded for many years by attacks of colic, in which he believes the colic to be due to the passage of pancreatic calculi, diabetes supervening only when the pancreas has undergone complete atrophy as the result of the calculous disease. The impaction of such a calculus at the opening of the common duct would cause jaundice, and would with great difficulty be distinguished from an attack of biliary colic, but I do not think it would give rise to distension of the gall bladder.

GASTRIC GLYCOSURIA.

The 9 cases which I have grouped together under the heading of gastritis presented many clinical differences. In none have I seen any reason to suspect alcohol, although this factor is, of course, possible. In 2 the amount of sugar was considerable—that is to say, 5 per cent. in one case, and 3 per cent. in the other.

CASE XV.—A small manufacturer, aged 51, was sent to me on June 30th, 1896, because sugar had been found in his urine. He said that he felt in perfectly good health, but he felt sure that he had recently had a slight attack of influenza, to which he attributed his present condition. There was no thirst or polyuria. He had lately lost a stone in weight. He complained of some muscular pains. His tongue was foul; bowels

confined; urine 1032, acid, no albumen, sugar 3 per cent. He was treated for gastritis. I did not see him again, but for the purposes of this lecture I wrote to inquire, and in reply I received the following letter:

"Dear Sir,—In answer to yours of yesterday, I am glad to say that I have been in fairly good health since the time you mention in June, 1896. I have never had to call in a medical man since that time, and I take this opportunity to thank you for your good advice upon that occasion, also for your kind inquiry."

Of course it is possible that this may have been a post-influenzal glycosuria; but so far as I could make out there had been no definite illness which could be called an attack of influenza. The patient merely meant to say that he believed he must have had influenza, but that it had not been recognised.

The other case where sugar was abundant was as follows:

CASE XVI.—A shopkeeper in a large way of business, aged 50, consulted me on October 1st, 1891, for sickness and debility, which had been troubling him all the year. At that time his urine contained no sugar, but there was a haze of albumen. I saw him again on January 12th, 1895, when his urine contained 5 per cent. of sugar, and was phosphatic. Under treatment the sugar disappeared, and he remains perfectly well up to the present time.

All these cases included under alcohol, liver diseases, and gastritis probably have some connecting link, which, could we discover it, would throw light upon the true etiology of glycosuria. It is probable that this factor is some derangement of one of the important organs concerned in digestion. From the well-known relation of the liver to sugar production it would certainly seem most reasonable to regard this organ as the one most likely to be in fault. The probability is that in these conditions there are sudden discharges of sugar from the liver into the blood in quantity greater than can be used up in the body.

NEURASTHENIC GLYCOSURIA.

I believe that a few years ago Dr. Goodhart said that he had frequently found sugar present in patients suffering from neurasthenia. I thought at the time that he overstated the frequency, as having had a good many cases of neurasthenia under my care for special treatment, I had not observed it as at all a common symptom. But from the standpoint of glycosuria I find that I have 4 cases which I can only classify under the heading of neurasthenia; and I believe we must recognise the fact that glycosuria does occur in a certain number of neurasthenic cases without other discoverable cause. The following case seems to me to be a good illustration:

CASE XVII.—A metal broker, aged 31, consulted me on November 16th, 1899, complaining of headache, want of energy, and of frequent bad colds in his head. He said that twelve or fourteen years ago he had post-scarlatinal albuminuria, and that he had never enjoyed very good health. He was a tall, thin, cadaverous-looking man, with an earthy complexion; height 5 feet 10 inches; weight 9 st. 10 lbs. He lived at home with his father and mother, but his business took him all about the district. He described his business as being one that gave him a good deal of worry. His habits were regular; he rarely took any stimulants; his tongue was a little furred posteriorly, but he had no pain or discomfort after food. His thoracic and abdominal organs appeared normal. His urine was: specific gravity 1025, clear, acid, no albumen, sugar 0.5 per cent. It deposited a fleecy cloud of small oxalates. My treatment was directed towards his neurasthenic condition so as to improve his general health, and when I saw him last on February 1st of the present year he had gained 7 lbs. in weight, and the sugar had completely disappeared from his urine.

CASE XVIII.—A young lady, aged 19, was sent to me in 1894 by Dr. Lupton, of Stratford-on-Avon, because he had found sugar in her urine. Her father was the subject of chronic glycosuria. She complained of feeling tired, of loss of weight, and of constipation. She had never had any serious illness. Her doctor said that the specimen of water he examined was specific gravity 1034. She was a languid, ill-nourished girl, but I could not find anything wrong in any of her organs, and the urine I examined contained no sugar. In answer to my

recent inquiry, her doctor has informed me that she has been for some time married, and has left the neighbourhood; but he knows that a short time ago she was very well.

CASE XIX.—A manufacturer, aged 26, consulted me in June, 1893, on account of the presence of sugar in his urine. He had lost 9 lbs. in weight during the previous four or five months, but had not suffered from polyuria or thirst. He complained of having had a great deal of worry in his business. I could find nothing wrong in his chest or abdomen, but the urine was specific gravity 1030, and contained 0.75 per cent. of sugar. A few weeks later he had much improved in health, and the sugar had disappeared.

The next instance is a somewhat more complex one.

CASE XX.—A medical practitioner, aged 43, consulted me on November 19th, 1897, for loss of weight and glycosuria. He had been ailing for three years, but before that time had enjoyed fairly good health. During the last four months he had lost 17 lbs. in weight, but there had been no polyuria or thirst. After every meal he said that his body temperature rose slightly. He weighed 10 st. 2 lbs., and the amount of urine in twenty-four hours was 50 ounces. I have no note of the amount of sugar.

I wrote to him a few weeks ago to ask him to report upon his present condition. He tells me that he is now 9 st. 11 lbs. in weight; that his urine is generally from 30 to 35 ounces in twenty-four hours, and never exceeds 50 ounces; that he takes ordinary diet; and that his urine at times contains a trace of sugar. He sent me a specimen of his urine, which was amber, turbid from urates, acid, specific gravity 1018, contained a trace of sugar, and a haze of albumen. He still considers that his temperature is affected occasionally, but I have not been able to get from him any actual figures. He complains of a feeling of fullness in the epigastrium, which he associates with a flow of urine of low specific gravity and loss of weight. He says he is always better when the specific gravity of his urine is from 1020 to 1025, and always worse when it is from 1005 to 1010. He attributes his condition to a neurosis.

SENILE GLYCOSURIA.

The only other special form of glycosuria to which I wish to draw your attention is that which occurs in old people who are suffering from senile decay. This glycosuria is not associated with any of the symptoms of diabetes, but is sufficiently marked to cause a free reduction of copper.

CASE XXI.—An old gentleman, aged 72, consulted me in July, 1889, on account of flatulence, sickness, and failing health. In 1864 he had rheumatic fever, but had enjoyed very good health up to six weeks ago, except that he had always been troubled with indigestion. He had worked very hard at his business, by which he had acquired a large fortune. When I examined him his heart was dilated, but there was no murmur. The pulse was slow and intermittent, and his feet became oedematous towards night. His urine was free from albumen, but contained sugar. He was evidently breaking up, and died not very long afterwards.

CASE XXII.—Another case was an old patient, aged 71, who was sent to me by Dr. Young, whom he had consulted on account of his eyesight. There was a cataract in the left eye, and in the right eye there were striated hæmorrhages round the yellow spot. On examining the urine Dr. Young found sugar. There had been no polyuria, wasting, or thirst, and I found the urine, which was of specific gravity 1018, to contain a moderate amount of sugar; it was free from albumen.

As the glycosuria in these cases must be regarded as a symptom of a general tendency to break down, care must be exercised in ordering strict diabetic diet. From what has been said in the preceding parts of this lecture, it will have been seen that I do not advocate the treatment of these cases of non-diabetic glycosuria by diabetic diet, and where this may have been ordered it has been only for experiment, in order to see what influence it has upon the glycosuria. In these old people it is especially necessary to be cautious, and while there can be no harm in stopping sugar and sweet wines, I should hesitate to deprive them of bread or potatoes, or any farinaceous food they are in the habit of taking.

The purpose of this lecture is not to discuss questions of treatment, for which the time at my disposal is not adequate; but to draw your attention to the conditions other than

diabetes under which we may meet with the occurrence of sugar in the urine, in order that you may be able to estimate correctly the value of this symptom when you encounter it, and to avoid some grave errors of diagnosis and prognosis.

NOTE.

With reference to the occurrence of glycosuria in association with boils and carbuncles (a fact known to and first recorded by Cheselden), it is interesting to note that Professor Lépine, of Lyons, has recently reported to the Société de Biologie (*La Semaine Médicale*, March 7th, 1900) that he has observed in numerous experiments made on dogs that half an hour or an hour after the introduction into the veins of a pure culture of staphylococci a more or less considerable increase of sugar occurs in the blood, which decreases rapidly, and may be followed by an actual reduction below the normal amount.

THE LUMLEIAN LECTURES ON SOME CIRRHOSSES OF THE LIVER.

Delivered before the Royal College of Physicians

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LECTURE III.

TREATMENT.

TREATMENT OF CIRRHOSIS.

THE treatment of cirrhosis resolves itself chiefly into an attempt to preserve the *status quo*, as far as the liver is concerned, to prevent the disease advancing, and to relieve any difficulties or imperfections which may arise in the bodily condition, as the result of the hepatic inefficiency. No remedy will remove the fibrous tissue which has choked the liver cells; no drug will restore the cells thus destroyed. The only condition in which the invading agent can be removed to some extent by treatment is in the early stage of syphilitic cirrhosis, when the gummata are not yet organised, and the arteritis and perihepatic inflammation are comparatively recent. For the rest, all that can be done is to attempt to relieve the injured machinery and supplement its powers, so that the crippled organism may survive. When the injury is not extreme this can be done, and the cirrhotic patient hold on to life in fair health and comfort, sometimes for years.

With regard to the first great canon of treatment, the prevention of increase of fibrosis and destruction of liver tissue, absolute abstention from alcohol and all stimulating ingesta is of course the prime necessity. It is as essential in the syphilitic and malarial cases as in those of direct alcoholic origin. There is, however, one reservation to be made. When the last stage of emaciation and exhaustion has been reached, the total privation of alcohol, as we often see in hospital wards, hastens the final collapse. And in the same way, all foods which tax especially the physiological function of the liver, and therefore tend to embarrass and engorge it, such as those rich in fats and sugar, should also be given in reduced quantity, or altogether prohibited. The diet should be restricted to milk, eggs, the simpler proteids, bread, and fresh fruit and vegetables.

It is to be remembered that not only is the passage of nutriment prepared by gastric and intestinal digestion for distribution by the systemic vessels, interfered with by the portal obstruction, but that the glandular structure of the liver is partly destroyed and its physiological function necessarily impaired also. We are too apt, I think, to look upon the question of nutrition in cirrhosis as one of mere difficulty of transport, whereas it is largely one of preparation for absorption and assimilation and of elimination. The secretion of bile, the glycogenic conversion of the carbonaceous elements of food, the mysterious part played by the liver in the metabolism of nitrogenous waste, are all interfered with, and the general nutrition of the body suffers in like degree.

In all cases, therefore, where signs of defective nutrition appear, such as wasting, anæmia, debility, it is well to supplement the work of the digestive machinery by artificial means. Predigested foods, especially pancreatised preparations, or pancreatin in keratin capsules, given with food, are useful aids to the defective liver function.