

John Rollo

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In 1797 there was published in England a book entitled in part, *An Account of Two Cases of the Diabetes Mellitus*. In it John Rollo, M.D., a surgeon of the Royal Artillery, recorded in detail his observations regarding the course of diabetes in two patients treated by means of a special diet. As a result, his methods of treatment and ideas regarding the origin of diabetes were widely discussed in England and on the Continent with acceptance by some and rejection by others. Rollo has become known as the first, or certainly one of the first, to plan definite diets for diabetic patients.

Rollo was born in Scotland and received his medical education at Edinburgh. He became a surgeon in the English army in 1776 and served in the West Indies, being stationed on the island of St. Lucia in 1778 and 1779 and on Barbados in 1791. He appears to have been a man of inquiring mind with both talent and energy. As a military physician, his interest in disease was general. His account entitled *Observations on the Diseases in the Army on St. Lucia* was published in 1781. This was followed in 1785 by *Remarks on the Disease lately described by Dr. Hendy* (that form of elephantiasis so common as to be known as "Barbados leg") and in 1786 by *Observations on the Acute Dysentery*. He was advanced to the grade of Surgeon-General in 1794. In 1801 there appeared his *Short Account of the Royal Artillery Hospital at Woolwich* and in 1804

a *Medical Report on Cases of Inoculation* in which he supported the views of Jenner. Rollo died in 1809 at Woolwich, the seat of the Royal Artillery Academy and now a borough of London.¹

A second edition of the book on diabetes was published in 1798² and a third in 1806. Rollo was frequently consulted regarding cases of diabetes and his book carried notes and communications regarding patients seen by other physicians who had applied his method of treatment and had written to him regarding the results. In his work Rollo had the cooperation of William Cruickshank, artillery surgeon, chemist and apothecary, who carried out studies on the quantity and nature of the sugar in urine.

Rollo's account of the circumstances under which he became interested in the treatment of diabetes reads in part as follows:²

"In the year 1777 . . . I saw a case of the Diabetes Mellitus in a weaver at Edinburgh. He had been at least four months in the Royal Infirmary without having derived any advantage, and was chiefly under the care of the late Dr. Hope, Professor of Botany. When the patient was discharged, a Mr. Johnstone, then a Student of Physic, and myself, detained him a few days, and paid his expenses, in order to bleed him, and obtain some of his urine, so as to ascertain the appearances and spontaneous changes. I well remember that the blood and urine exhibited the appearances described by Dr. Dobson; but the papers, and a portion of the saccharine extract, which I carried with me abroad, were lost in the hurricane at Barbadoes in 1789.

"From that period I had not met with a case of Diabetes, although I had observed an extensive range of disease in America, the West Indies, and in England, until 1796.

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"Captain Meredith, of the Royal Artillery, being an acquaintance, I had seen him very frequently, previous to his going on camp duty in 1794, but then he had no disease; however, he always had impressed me, from his being a large corpulent person, with the idea that he was not unlikely to fall into disease. (*Editor: Another instance of Rollo's clinical acuteness.*)

"On the 12th of June, 1796, he visited me, and though I was at once struck with the diminution of his size, yet, at the same time, the colour of his face being ruddy, I received no impression, otherwise than of his being in health: a moment's conversation, however, convinced me of the contrary. . . .

"He complained of great thirst and a keenness of appetite; his skin was hot, dry and parched; and his pulse small and quick. He told me his complaints had been attributed to an old disease, and a liver affection. The thirst, dry skin, and quick pulse, marking a febrile state, depending probably on some local circumstance, and connecting these with the keenness of appetite, Diabetes immediately suggested itself to me. I enquired into the state of his urine, which I found in quantity and colour to be characteristic of the disease; and was at the same time much surprised, that for the two or three months he had been under the care of a Physician and Surgeon, the circumstance of the increased urine had not been known to them. The patient told me, as he drank so much, the quantity of urine had appeared to him a necessary consequence; and of course never having been asked about it, he gave no information. I directed him to keep the urine he next passed, and, on examination, it was found to be sweet; in consequence of which the disease became sufficiently ascertained."

At another point in the case history, Rollo states that Captain Meredith was 34 years of age and was 71 $\frac{3}{4}$ inches tall. At the time of beginning of the special treatment, the symptoms of diabetes had been present seven months or more and his weight had fallen from 232 to 162 pounds.

A view held by some at that time was that diabetes was a primary affection of the kidneys. However, Rollo developed the idea that the disease was "a primary and peculiar affection" of the stomach in which, due to some morbid changes in "the natural powers of digestion and assimilation," sugar or saccharine material was formed in that organ, chiefly from vegetable matter. It was on this basis that he advocated the use of an animal diet together with certain medication designed to quiet the overactive stomach and to diminish the appetite. Following initial blood-lettings, Rollo's treatment of Captain Meredith was as follows:

"1st. The diet to consist of animal food principally, and to be thus regulated:

Breakfast. One and a half pint of milk and half a pint of lime-water, mixed together; and bread and butter.

Noon. Plain blood-puddings, made of blood and suet only.

Dinner. Game, or old meats, which have been long kept;

and as far as the stomach may bear, fat and rancid old meats, as pork. To eat in moderation.

Supper. The same as breakfast.

"2dly. A drachm of kali sulphuratum to be dissolved in four quarts of water which has been boiled, and to be used for daily drink.

No other article whatever, either eatable or drinkable, to be allowed, than what has been stated.

"3dly. The skin to be annointed with hog's lard every morning. Flannel to be worn next the skin. The gentlest exercise to be only permitted; but confinement to be preferred.

"4thly. A draught at bed-time of twenty drops of tar-tarized antimonial wine, and twenty-five of tincture of opium; and the quantities to be gradually increased. In reserve, as substances diminishing action, tobacco and foxglove.

"5thly. An ulceration, about the size of half a crown, to be produced and maintained externally, and immediately opposite to each kidney. And,

"6thly. A pill of equal parts aloes and soap, to keep the bowels regularly open."

Captain Meredith began the above treatment on Oct. 19, 1796. Two days later the quantity of urine passed in twenty-four hours had fallen from seven or eight quarts to six quarts. By November 1 the quantity did not exceed four quarts and on November 4 "he drank only three pints of water, and made only two quarts of urine, which to him and his servants (who had been in the habit of tasting his urine from curiosity) was not sweet." As time went on, the opium at bedtime was discontinued and the rubbing with hog's lard was left off. The latter was found to be a "troublesome and disagreeable" part of the treatment. Rollo decided to simplify therapy to include those features which were considered really essential: animal food, confinement with limitation of activity, and hepatic ammonia. The hepatic ammonia (ammonium sulphide) was used in place of "kali sulphuratum," originally prescribed, with the thought that it might be "a more certain and active medicine than the other on the stomach, in diminishing its action."

Captain Meredith was directed to keep notes regarding his symptoms, diet, medication and progress of his illness. He did this quite faithfully, recording his transgressions as well as his attempts at cooperation. When at times he indulged in apples, bread and beer, Rollo found it necessary "to point out in stronger language the impropriety of such deviations." By December 30 the patient was free from abnormal thirst and polyuria, was regaining some of his lost weight and felt well. Continuation of treatment with a somewhat more liberal allowance of bread in the diet was prescribed.

Rollo's second case was an unnamed "General Of-

ficer," aged 57, with symptoms of diabetes dating back at least three years. His primary disease was complicated by other conditions and he was not nearly as cooperative as Captain Meredith. He died nineteen months after first being seen, having been under Rollo's direct observation for less than two months. During the last three months of his life he had returned to an unrestricted diet including apple-pudding, tea with sugar, and wine.

Rollo, with the aid of Cruickshank, carried out laboratory studies with his patients to ascertain the results of treatment and to elucidate the nature of diabetes. The fluid intake, urine output and the body weight were determined. The urine was tasted to indicate the presence of sugar and subjected to experiments before and after evaporation to determine its chemical composition and content of sugar. At the beginning of treatment when Captain Meredith was passing up to twelve quarts of urine in twenty-four hours, the following notes were made:

"Mr. Cruickshank took 36 ounces troy weight of urine voided today, and it yielded by evaporation three ounces and one drachm of saccharine extract, of the appearance of molasses, but thicker, having nearly the consistence of wax, and somewhat tenacious. If, therefore, the whole of the day's urine had been evaporated it would have yielded about 29 ounces troy weight, an astonishing quantity to be formed and separated from the system. By standing in the air it became moist, and of nearly the consistence, smell and appearance of treacle.

"Treating some of this extract with the nitrous acid, he procured the saccharine or oxalic acid; and with a smaller proportion of the acid it produced a substance, which in resemblance, and smell, could not be distinguished from honey."

From studies on blood, Rollo and Cruickshank concluded that sugar might be present without being detectable by taste and that if two or three ounces of serum from the blood of a diabetic patient were taken at a proper time after eating, it was probable that saccharine matter might be obtained. From such studies and from the finding of normal-appearing kidneys at autopsies on diabetic individuals, Rollo argued against the idea that diabetes was primarily a renal disease. Instead, he conceived of the process as follows:

"The serum of the blood apparently containing less saccharine matter than the urine, may depend on the power of the kidneys in separating it in common with the other saline matters of the blood; but proving a new and peculiar stimulus, their action is increased, and the saccharine matter consequently separated speedily and in proportion to its formation in the stomach."

In summing up and evaluating Rollo's contributions, we find among his erroneous ideas and bizarre

treatment much that was good. He conceived of diabetes as being a disease of the stomach with overactivity of that organ with the secretion of an abnormal gastric juice and the formation of sugar in the stomach chiefly from foods of vegetable, as opposed to animal, origin. Hence the source of sugar formed in the stomach was to be reduced by using a diet liberal in protein and fat and restricted in carbohydrate (though milk was included provisionally under animal food). In order to quiet the stomach and reduce the appetite, drugs were given to produce anorexia and nausea. These included potassium sulphate (later ammonium sulphide), antimony, opium, tobacco and digitalis. "Fat and rancid old meats" likewise tended to discourage appetite. The end-result of Rollo's plan of treatment was an over-all restriction in calories, particularly those derived from carbohydrate. In this connection it is instructive to note that when Captain Meredith had improved and glycosuria was thought to have disappeared, Rollo in liberalizing the diet directed him to begin with the "use of cabbage, or greens of a similar nature, boiled onions, or salad without acid sauce; also mustard, horse-radish, and common radish when in season."

Although Rollo's method of treatment was widely used and often enthusiastically endorsed, at least in part, by many physicians, it never gained general adoption in any country, except perhaps in England. Even there, a decline in popularity gradually took place which may be "attributed to the crudeness and imperfections in the method itself, the careless and faulty application of it by most physicians, the rebellion of patients—who generally, sooner or later, secretly or openly broke the intolerable dietary restrictions and relapsed—the failure of the method to check the severest cases, and the frequent bad results . . . of changing diabetic patients suddenly from a mixed diet to a strict protein-fat regimen."³ Nevertheless, Rollo's contribution to the development of knowledge regarding diabetes and its treatment was significant and has won for him lasting recognition.

REFERENCES

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