CHYLURIA.

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The celebrated physician of Cos was aware of the occurrence—rare though it is—of chyluria. Hippocrates has put on record the case history of the wife of Dromeades. This patient during the third day of the puerperium voided urine which appeared thick and white and on the following day it was definitely oily. The ancient physicians evidently correlated prognosis with the appearance of the urine in certain cases, for Galen in his commentary on this case was of opinion that the characters of the urine from the first were such as to indicate a fatal and speedy result. In the 10th century Theophilus called attention to the presence of oil in the urine of patients suffering from fevers, and stated that when the urine in consistence and colour resembles oil of a dark colour it prognosticates a fatal collapse. This interesting subject continued to attract the attention of the profession and in 1670 Valentine Andrea Moellenbrogii produced a treatise entitled “Mictione Chylosa”. This author’s pathology was noteworthy in that he considered chylous urine to be due to an abnormal junction of the urinary and lymphatic systems, but unfortunately his work loses much of its value in that in his description, there is confusion between pyuria and chyluria. Differentiation of the two conditions was clearly established a century later by Morgagni, who discussed in a scientific manner these two symptoms.

Reference to modern literature shows that this condition has continued to attract attention and cases have been reported from time to time. The majority of cases of chyluria are associated with the presence of *filaria sanguinis hominis* in the lymphatic system causing lymphatic obstruction. The terms tropical, parasitic or filarial chyluria have been applied to this larger group of cases. The smaller group of cases is designated non-parasitic and in certain of these cases the ætiology of the condition is somewhat obscure although various theories have been postulated to account for it.

A case of non-parasitic chyluria has been studied and the case record is reported in this paper. At the same time the salient features of the condition are reviewed and consideration is given to the various theories which have been put forward to explain the matter.

Case Record. Female aet. 61 was investigated on account of urine appearing milky.

History. In 1909 patient noticed that her urine looked like milk after a long-distance walk. The onset was sudden and the condition persisted for several days and disappeared. Four weeks later milky urine reappeared and persisted for several years. At times the appearance of the urine is almost normal especially during the summer months when the fatty constituents of her diet are almost eliminated. Posture has no effect on the urine. Frequency of micturition: Day 6—9; Night 1, in winter. Day 3; Night 0, in summer. There is no pain with micturition and no backache.

Past history. Patient was born in India. In 1899 patient states she had typhoid fever. In 1908 she had gall stone colic. Attacks recurred until 1911 when cholecystectomy was performed. No malaria.

Family history. Nil ad rem.

Examination. Healthy and well built. Height, 5ft. 7ins. Weight 12st. 12lbs. Neck: enlarged isthmus and right lateral lobe of thyroid gland. Chest: Heart, no abnormality. Lungs: no abnormality. Abdomen: no abnormality.

Examination of urine voided two hours after a meal consisting of boiled rice, potatoes and green vegetables:

Colour: resembles milk. Reaction: acid. Centrifuged deposit: microscopical examination showed red blood corpuscles up to 3 per field with 1/6th objective; white blood corpuscles up to 20 per field with 1/6th objective; numerous fat corpuscles and squamous epithelial cells. Protein present: 0.8 per cent. Total fat present: 0.69 per cent. Sugar: absent. Acetone: absent. Large fibrin clots were present. The fat was extracted with ether and a residue remained after the ether was evaporated off. Ziehl-Neelsen film: no tubercle bacilli seen.

Examination of urine obtained from each kidney after ureteric catheterisation:—

Urine from right kidney. Fat extracted with ether. Microscopic examination of centrifuged deposit showed numerous red blood corpuscles: few white blood corpuscles: few epithelial cells.

Urine from left kidney. Fat extracted with ether and less in quantity than in specimen from right kidney. Microscopical examination of centrifuged deposit showed numerous red blood corpuscles: few white blood corpuscles: few epithelial cells.

Examination of the blood:

Red blood corpuscles=5,350,000 per c.mm. White blood corpuscles=3,800 per c.mm. Hæmoglobin=84 per cent. Colour index=0.7. Polymorphonuclear leucocytes=74 per cent.=2,812. Lymphocytes=24 per cent.=912. Eosinophils=1.3 per cent.=49. Basophils=0. Large mononuclear leucocytes=0. No abnormal cells seen in films. Blood urea=31 mgs. per cent. Blood cholesterol=155 mgs. per cent. Wassermann reaction=negative. Sigma reaction=negative. Blood films for filaria Bancrofti=negative.

Cystoscopic examination (with Mr. R. Ogier Ward). Urine evacuated from the urinary bladder resembled milk. Cystocele present. No cystitis. No changes in the region of the internal urinary meatus. There was slight trabeculation of the urinary bladder at a distension of 8 ounces. The air bubble was in the normal position. The left lateral horn was normal. The trigone was normal with a finger in the vagina. The right lateral horn was normal except for one petechial hæmorrhage. In the middle line from the ureteric bar backwards there was no abnormality. In the middle line anteriorly up to the air bubble there was no abnormality. The left ureteric orifice was normal, the orifice being of the slit variety. The right ureteric orifice was larger and the lips were thickened, the orifice being of the slit variety. Both effluxes appeared normal.

Uroselectan examination. The pelvis and calyces of both kidneys appeared normal.

Classification.

There are two distinct varieties of chyluria: (1) the parasitic type; (2) the non-parasitic type. The parasitic type is usually due to the presence of *filaria sanguinis hominis* in the lymphatic system, but cases have been recorded in which infection with *echinococcus ascaris lumbricoides*, and malaria was present. The parasitic type has also been designated endemic or filarial chyluria. The non-parasitic type is seen less commonly and the ætiology is debatable.

Theories of causation of non-parasitic Chyluria.

1. **The secretory theory.** In 1841 Prout postulated the theory that fat passed directly from the blood into the urine through the kidney and he was supported in this view by Goetz and Young. The latter worker considered that a functional disturbance of renal cells was present which permitted the passage of abnormal constituents into the urine. It has been shown that lipuria can occur in association with lipæmia and in a case of diabetes mellitus with lipuria the kidney on section was found to be infiltrated with fat globules. Further experimental evidence has been adduced, for it has been found that lipuria was produced in rabbits by injecting fat into the blood stream. It is erroneous to suppose that a high concentration of fat in the blood is necessary to produce chyluria and the secretory theory cannot be condemned on the ground that chyle may only be discharged from one kidney, for it is known that orthostatic albuminuria may also be unilateral. Nakamma has noted a disturbance of liver function in addition to renal function in cases of chyluria and states that as the excretion of chyle diminishes the function of the liver improves.

2. **The lympho-urinary fistula theory.** In 1863 Ackermann propounded the theory that in cases of non-parasitic chyluria there is a fistula between the urinary system and the lymphatic system and lymph passes directly into the urinary system being voided in the urine. It is necessary to postulate the presence of obstruction in the lymphatic flow between the lymphatics in the mesentery of the small intestine and the upper end of the thoracic duct with subsequent lymphatic stasis and dilatation of the peripheral lymphatic vessels. Eventually rupture of lymphatic vessels may occur with the production of either chylous ascites, chylocele or chyluria. The cause of the lymphatic obstruction may be a tumour, enlarged retroperitoneal lymph nodes, or tuberculosis. The fistula between the lymphatic and urinary systems may be present in the region of the renal pelvis or urinary bladder. Several authors have reported the presence of fistulous communications between the lymphatic system and renal pelvis or urinary bladder, but the evidence supporting the presence of lymphatic obstruction is less convincing.

Wesson has reported six cases of lympho-urinary fistulæ in cases of chyluria and found that four occurred on the left and two on the right. In three cases the fistulous opening was in the superior calyx; in one case in the superior and middle calices and in two cases in the renal pelvis.

Symptomatology.

Chyluria usually appears suddenly in a patient of previous good health. Its behaviour may be capricious in that it may suddenly disappear permanently, or it may manifest itself periodically or intermittently. It may be noted at all times of the day and night, or it may be absent during either the day or night. Its presence may be influenced by exercise or posture of the body. Exacerbations may accompany menstruation or pregnancy. The only constant symptom is the appearance of the urine. Chylous urine has an opaque milky appearance; it may be pink in colour when blood is present. Fat is present in molecular form and albumen and fibrin are also present. The latter may be present in sufficient quantity to initiate coagulation of the voided urine and sometimes coagulation occurs before the urine is voided causing urinary obstruction and pain. Quantitative estimations have been carried out concerning certain constituents of chylous

urine. It has been found that the quantity of fat varies from 0.028 to 4 per cent. and albumen from 0.12 per cent. to 2.7 per cent.

It has been found that the amount of fat ingested in the patient's diet exerts an influence on the amount of fat excreted in the urine and it has been shown that the fat in chylous urine is the same as the fat ingested in the food. It appears that excessive quantities of carbohydrate and protein in the diet exert no influence on the chylous urine.

Cases have been reported in which the urine was chylous only when the patient assumed the position of decubitus. The opposite condition has also been reported in many cases.

Diagnosis.

The diagnosis of chyluria depends upon the examination of the urine. If urine is milky in appearance it does not necessarily mean that chyluria is present. The appearance of pyuria is sometimes milky. In lipuria fat globules may give the urine a milky appearance but the other elements of chyle are absent and there is co-existent lipæmia. Chyluria contains fat in molecular form, lymphocytes, albumen and fibrin.

In all cases of chyluria the blood must be examined for the presence of *filaria sanguinis hominis*. In addition to a careful investigation of the urine a cystoscopic examination should be instituted in order to identify any fistulous opening into the urinary bladder which may be present and to catheterise the ureters in order to determine in renal cases whether the condition of chyluria is unilateral or bilateral.

A uroselectan examination should be carried out and retrograde pyelography should be performed in order to demonstrate any connection which may be present between the lymphatics and the renal pelves and calices.

Prognosis.

Chyluria may be present over a period of many years without causing any marked changes in the patients' health and it may disappear spontaneously. In some cases long standing chyluria may initiate anæmia of varying severity and debility. Some patients suffer from mental depression owing to constant worry concerning the appearance of the urine.

Treatment.

In cases of filarial infection treatment should be directed against the infection.

In cases of non-parasitic chyluria fats should be restricted in the patient's diet and rest after meals must be taken. If the chyluria is influenced by posture the patient should ingest his food in the most satisfactory position.

Lavage of the renal pelves has been carried out in certain cases with some success. Thus Takahasi and Ideda report excellent results by lavage of the kidney pelvis with a solution of physiological saline. The results were the same regardless of the presence or not of filaria in the blood stream. Cases most resistant to treatment were those of long standing over a period of ten to thirty years. In these cases improved results were obtained by using a solution of sodium iodide.

In certain cases lavage of the renal pelvis has been combined with a course of X-ray therapy with satisfactory results. Kidd has described a case of unilateral parasitic chyluria cured by nephrectomy and this operation may be necessary when chyluria threatens life.

Conclusion.

A case of chyluria of bilateral renal origin—non-parasitic type—is reported. The theories of causation of non-parasitic chyluria are reviewed. The symptomatology, diagnosis, treatment and prognosis are discussed.

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