Short reports

Factitious diabetes mellitus confirmed by ascorbic acid

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SUMMARY We report a girl aged 3½ years in whom signs and symptoms of diabetes mellitus were falsified by the mother. Evaluation in hospital rapidly ruled out diabetes mellitus and the use of ascorbic acid as a marker enabled us to prove urine substitution by the girl's mother.

Munchausen syndrome by proxy is a disorder in which signs or symptoms of disease are fabricated by someone other than the patient. Falsification of urine specimens is a common feature. We report the use of ascorbic acid as a marker of the origin of urine and an aid to uncovering deception.

Case report

A 3½ year old girl presented to the paediatric clinic at the Naval Hospital, Bethesda with a three week history of polydipsia, polyuria, nocturnal enuresis, and weight loss. The mother, who was said to have been insulin-dependent but was now a diet controlled diabetic, reported finding 3+ glucose on five measurements of her daughter's urine. On the day of admission, the patient had presented at a local clinic with the same symptoms, and although arrangements had been made to evaluate the child as an outpatient, the mother independently brought the child to our clinic. The child's medical history was remarkable in that she had received no medical care since the age of 2 weeks and had not been immunised. A social history showed a disrupted family background—the parents were divorced, the child lived with her mother, and her father was stationed overseas. A physical examination was normal. Her height was at the fifth centile and weight was at the 15th centile. Initial laboratory studies included normal complete blood count, blood urea nitrogen, and serum electrolytes. Serum glucose was 4.3 mmol/l. Urinalysis showed a specific gravity of 1.021, pH was 6.5, and a dipstick test was negative for glucose, ketones, and protein. There were no casts, no white or red blood

cells, few epithelial cells, and urine culture was negative.

Hospital course. Several fasting blood glucose determinations were normal (5.0, 4.0, and 3.95 mmol/l), but the urine samples collected by the mother continued to show 2+ to 4+ glucose and small to large acetone. Ascorbic acid (100 mg/kg) was added to a glass of orange juice, and given to the child four times a day. All the urine specimens were tested with N-multistix-C (Miles Laboratories). From then on each specimen collected by the nursing staff showed no glucose or ketones, but was positive for ascorbic acid (75 to 150 mg/dl). When the mother collected the urine and handed the specimens to the nurses for testing, they continued to show 2+ to 4+ glucose and small to large ketones but were negative for ascorbic acid. This clearly confirmed that urine specimens collected by the mother were not obtained from her child. (These specimens were most likely her own.) The facts were immediately presented to the judicial authorities and a hearing was held which led to the removal of the child from the mother's custody. Subsequently, the result of a glycosylated haemoglobin test taken at admission became available, and was 6.7% (normal 5.5 to 8.6%). Eighteen months later, she is being cared for by her father and is doing well.

Discussion

Munchausen syndrome by proxy is generally regarded as a form of child abuse since the child may be subjected to unnecessary diagnostic procedures that are frequently painful and sometimes potentially dangerous. The child in this case was certainly abused as she had to undergo needless examinations, venipunctures, and restriction to a hospital ward. In addition, there was the possibility that the mother might have proceeded to more dangerous acts such as the injection of insulin, as in a case reported by Mayefsky, *et al.*¹

In a recent review by Meadow,² 12 of 19 cases of Munchausen syndrome by proxy involved falsified findings in the urine. Five of these 12 were cases of glycosuria. The use of ascorbic acid to identify the origin of urine specimens is simple, safe, discreet, and rapid. Ascorbic acid can be added to orange juice and given without being noticed by the patient or his caretaker. We used N-multistix-C, a reagent strip for urinalysis. One of the reagent areas tests for ascorbic acid and is based upon the chemical reduction of methylene green to its leuco form by ascorbic acid. The reagent area seems blue because of an inactive red background dye, but the colour changes from blue to purple with increasing ascorbic acid concentration.

Without supplementation, the usual amount of ascorbic acid excreted in urine is 2 to 10 mg/dl.^{3,4} Urine values of habitual users of large quantities of ascorbic acid may, however, rise to 200 mg/dl.⁵ The N-multistix-C test has a sensitivity of 25 mg/dl. High values of bilirubin or pH higher than 7.5 may cause an atypical colour. The test is insensitive to urate creatinine, gentisic acid, and salicylate.

In summary, factitious diabetes mellitus fabricated by this patient's mother was rapidly and safely confirmed by using oral ascorbic acid as a marker of the origin of the urine. The results of this objective

method were presented as evidence to the judicial authorities and led to the placement of the patient in a safer environment.

References

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Received 5 November 1983

In the UK the ascorbic acid detector strip is available as C-Stix marketed by the Ames Division of Miles Laboratories—Ed.

Diabetes and developing knowledge of the body

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SUMMARY Fifty seven diabetic children were compared with healthy children for knowledge of their bodies and causes of diabetes. Diabetic children were more likely to include the pancreas and less likely to include the brain or stomach in drawing their bodies. The data have implications for understanding how illness affects psychological development.

Recent research suggests that lay people have poor knowledge of body organisation and function,¹ and that this limits successful communication between doctor and patient. Other work indicates that illness itself may influence a patient's knowledge of the body.^{2,3} There have, however, been few empirical attempts to investigate how illness affects a child's

knowledge of his body and one exception is a study of children with heart disease by Green and Levitt.⁴ In addition, some evidence that children with diabetes have distorted self images was reported by Kaufman and Hersher,⁵ who studied five teenage diabetics. It was concluded that these children believed their stomachs were larger than average (since they are required to eat more often than others they must have larger stomachs to fill), and that some thought that the pancreas was missing, either in whole or in part. Misconceptions seemed to persist despite instructions to the contrary and Kaufman and Hersher inferred that the education of diabetic children may well be hampered by their distorted knowledge of their bodies.

Our purpose was to investigate for a larger sample of diabetic children any such differences in body knowledge and associated distortions in beliefs about body functioning and the cause of diabetes.