Renal disease in youth with type 2 diabetes: Need for early detection

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Mary is a fifteen-and-a-half-year-old girl of self-declared First Nations heritage. She was diagnosed with type 2 diabetes mellitus (T2DM) at 13 years of age. She was not symptomatic at presentation and was diagnosed by targeted screening because she was recognized to have multiple risk factors, including membership in a high-risk ethnic group, obesity, a strong family history of diabetes and the presence of acanthosis nigricans. Affected family members include her mother, maternal grandmother and a maternal aunt. Her grandmother is currently on renal dialysis.

Mary manages her diabetes with intensive lifestyle measures and is maintaining a hemoglobin A1c level within a target range of less than 7.0%. She is seen by the paediatric diabetes team every three months. Annual screening for microvascular complications began at diagnosis. Six months previously, her random albumin to creatinine ratio (ACR) was elevated; thus, her ACR in a first-morning urine sample was measured. This measurement was also elevated at 9.2 mg/mmol (normal ACR being less than 2.8 mg/mmol). A repeat first-morning urine ACR three months later remained elevated at 8.2 mg/mmol. A referral was made to the paediatric nephrology department for further evaluation.

LEARNING POINTS

- The prevalence of childhood-onset T2DM is increasing worldwide. A recent Canadian Paediatric Surveillance Program study revealed a minimum incidence of T2DM in children younger than 18 years of age of 1.54 cases per 100,000 children per year. However, a significant regional variation has been identified, with the highest rates reported in Manitoba at 12.35 cases per 100,000 children per year.

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- Risk factors for T2DM in childhood include a strong family history of T2DM, membership in a high-risk ethnic group, obesity, and other clinical signs or symptoms of insulin resistance, such as hypertension, dyslipidemia, acanthosis nigricans or polycystic ovarian syndrome. Symptoms of hyperglycemia, such as polydypsia, polyuria and weight loss, may or may not be present at diagnosis.
- The natural history of childhood-onset T2DM is just being described; however, preliminary data suggest that complications may be present at diagnosis. Thus, current guidelines recommend that complication screening should begin at diagnosis (www.diabetes.ca/for-professionals/resources/2008-cpg/).
- Diabetic nephropathy is the leading cause of end-stage renal failure in adults. The first sign of diabetic nephropathy is microalbuminuria, which may progress to macroalbuminuria and, ultimately, to end-stage renal disease requiring renal dialysis and/or transplant. It is imperative to identify albuminuria early because studies in adults demonstrate that progression can be prevented, with early interventions having the greatest impact.
- The screening test for microalbuminuria in diabetes is a urine ACR. A timed 24 h urine collection for albumin can also be used.
- Transient albuminuria can be caused by a febrile illness, acute hyperglycemia, exercise, urinary tract infection, heart failure and hypertension. There is also some variability in day-to-day albumin secretion, and adolescents can have benign orthostatic proteinuria. It is therefore important to demonstrate persistent elevation in two out of three samples over a three- to six-month period. Samples must be at least one month apart, and at least one sample must be a first-morning or overnight sample.
- The Canadian Paediatric Surveillance Program study for the prevalence of persistent albuminuria in children with T2DM is necessary to define the spectrum and extent of the problem. This is important for predicting burden of illness, and for planning screening and intervention programs. Identification of the population of children affected with T2DM and persistent albuminuria will facilitate research to understand the etiology and prevention of this significant complication.

The Canadian Paediatric Surveillance Program (CPSP) is a joint project of the Canadian Paediatric Society and the Public Health Agency of Canada, which undertakes the surveillance of rare diseases and conditions in children and youth. For more information, visit our Web site at <www.cps.ca/cpsp>.