



Pediatric Clips

NURSING

Diabetes mellitus

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Pediatric Nursing Clips by Pediatric Advanced Practice Nurses at Dayton Children's provides quick reviews of common pediatric conditions.

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CASE STUDY

Rachel, a 30-month-old girl, presented to her pediatrician after four days of wetting the bed at night. She had been potty trained six months ago and her mother brought her out of concern that she was regressing. Mother reported that Rachel had not been herself, was clingy, whiny and wanted to hold her teddy bear close, while not wanting to play. She was not eating well and most of the time only wanted to drink. Besides bed-wetting at night, Rachel was using the bathroom often during the

day. She had a tummy ache over the previous two to three days, but had not vomited nor had diarrhea. Upon measuring vital statistics, Rachel had no weight gain since her well-child check at two years of age. Her pediatrician suspected a urinary tract infection and performed a routine dipstick. The white blood cells and leukocytes were normal, but the glucose level in the urine was >1000 mg/dL and there were a small amount of ketones present. The pediatrician then had her blood sugar checked

(per glucometer) with a result of 410mg/dl. Type 1 diabetes mellitus (DM) was suspected and a consultation with a pediatric endocrinology team was made. The child was sent to the emergency room for immediate evaluation. The serum glucose was again elevated at 488 mg/dL and the HbA1C elevated at 8.0% confirming the diagnosis of DM. Rachel was admitted for additional treatment and education.

CASE DISCUSSION

Type 1 diabetes mellitus (DM) is an autoimmune disease where the patient develops destructive antibodies against the beta islet cells of the pancreas. Insulin is a polypeptide hormone produced by the islet cells and is important for glucose metabolism and carbohydrate storage. After 80 percent of the islet cells have been destroyed, the lack of insulin leads to elevated blood sugars. The classic signs and symptoms of diabetes mellitus include increased thirst (polydipsia), increased urine output (polyuria), bed-wetting (enuresis), as well as weight loss or poor weight gain. Without adequate insulin the body is unable to use the circulating glucose for energy and fat is broken down into ketone bodies to be used as an alternate body fuel. The build up of these acidic ketone bodies in the bloodstream can cause abdominal pain, nausea and vomiting, and lead to diabetic ketoacidosis (DKA).

DIAGNOSIS

Diagnosing type 1 DM in children involves documenting the classic signs and symptoms, and confirming an elevated serum glucose (> 200 mg/dL). An elevated HbA1C (>6.0%)

and a fasting blood sugar greater than 126mg/dl is also indicative of DM. Positive antibodies (GAD, islet cell and insulin) will confirm an autoimmune cause. Checking the basic metabolic panel and the beta-hydroxybutyrate is helpful in determining if the patient is acidotic (low CO2 level and elevated beta-hydroxybutyrate).

TREATMENT

The treatment of a patient with new onset type 1 DM involves medical therapy, family education and support. Treatment for DKA requires admission to the intensive care unit for IV rehydration, insulin drip therapy and close monitoring of vital signs, neurochecks, blood gases, blood glucoses and electrolytes. When the diagnosis of DM is made early, the child is admitted to the medical floor for therapy. These children may still need IV rehydration, require monitoring of their blood sugar, subcutaneous insulin therapy, development of a meal plan and education by the diabetes team.

DIABETES TEAM

The diabetes nurse educator educates the entire family on the pathophysiol-

ogy and treatment of type 1 DM from diagnosis. Parents and patients learn life skills, which include blood glucose testing (using their home glucose monitor), giving injections of insulin and monitoring urinary ketones. The family learns how to recognize and treat emergencies like hypoglycemia and hyperglycemia. The dietitian teaches the newly diagnosed family about how foods influence blood sugars and how the other nutrients are involved in balancing the meal. The social worker is pivotal in providing valuable insight into the social stability of the family and ensuring resources are available. The endocrinologist is the leader of the team, making sure each team member delivers what is needed to make a smooth transition from hospital to home. A hospital stay is typically at least two days and nights, which allows for stability of blood sugars before going home.

CONCLUSION

Rachel is young and her physician recognized the family needed flexibility in treating her with insulin. The insulin therapy started was with Lantus

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(long acting insulin that lasts about 24 hours) and Novolog (rapid acting insulin that peaks in one hour). Lantus is given once daily to provide the basal, background insulin and Novolog is given after each meal to cover the carbohydrates eaten and correct elevated blood sugars. This therapy combined with carbohydrate counting allows flexibility in the mealtime and amount of food eaten at each meal, which is variable with a toddler.

A child with type 1 DM faces many challenges, which become more complicated as life continues. Intensive blood sugar checks (four or more daily), balance of food, insulin and exercise are needed for

good glycemic control (parameters are 80 to 150mg/dl). Meal planning must include measuring the carbohydrates for accurate dosing with insulin. The importance of consistency in the treatment of type 1 DM cannot be overly stressed. There have been advances in blood glucose meters, ways to monitor trends in blood sugars. There are new ways to deliver insulin such as the insulin pump, but without the basic consistent care they are only pieces of equipment. It takes lifelong commitment to thwart the complications that can arise from excessive elevated blood sugar (blindness, kidney disease, neuropathy and others related to vascular problems). A child with diabe-

tes must have commitment from family, regular endocrinology and ophthalmology checks, and yearly comprehensive blood work to determine if complications exist.

REFERENCES

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Western Schools, Inc., 2004.

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Available at: <http://www.diabetes.org/type-1-diabetes.jsp>.

FEATURED NURSE SPECIALIST



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ENDOCRINOLOGY AND DIABETES AT DAYTON CHILDREN'S

The department of endocrinology at Dayton Children's provides expert care for

a variety of endocrine disorders in infants, children and teens. The diabetes team is comprised of a pediatric endocrinologist, diabetic nurse educator, lipid nurse and lipid dietitian. Dayton Children's provides a type 1 and 2 diabetes clinic, in addition to state-of-the-art diabetic therapy, education and support. For more information or to refer a patient to endocrinology or diabetes, call 937-641-3487.

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