Pediatric Diabetes

47 Progression of Atherosclerosis in Youth with Diabetes Mellitus Over a 2- to 8-Year Span

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Background: The age of onset and risk factors for premature atherosclerosis are not currently well understood.
Objective: To examine the progression of carotid artery intima-media thickness (IMT) and to delineate its relationship with traditional, diabetes-related, and nontraditional cardiovascular disease (CVD) risk factors for premature atherosclerosis in youth with type 1 diabetes mellitus (DM).
Methods: In this observational study, patients with type 1 DM and healthy controls aged 12 to 25 years will be observed for 2 to 8 years to elucidate processes involved in subclinical atherosclerosis.
Results: Preliminary results of 44 youth with type 1 DM, mean initial age 15.2 ± 2.23 years, with multiple IMT assessment, showed a difference between the first and second IMT ($P = 0.05$). The mean delta rate of progression was 0.0097 mm/yr over 1.6 ± 0.8 years. Twenty-six subjects had a positive IMT rate of change (0.040 ± 0.4 mm/yr), 2 subjects had no change, and 16 subjects had a negative change (–0.029 ± 0.033 mm/yr). Changes in glycosylated hemoglobin level, low-density lipoprotein (LDL), LDL high-density lipoprotein (HDL) ratios, and mean systolic blood pressure (SBP) were directionally similar to change in IMT values. A subanalysis of 26 subjects with positive IMT rates of change suggests that atherosclerosis might progress more rapidly in individuals with higher body mass index, LDL, LDL/HDL ratio, and SBP and in persons with poorer glycemic control.
Conclusion: Early treatment of modifiable, traditional, DM-related, and nontraditional CVD risk factors in youth with type 1 DM may avert progression of atherosclerosis and decrease the morbidity and mortality associated with CVD.

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48 Transient Neonatal Diabetes Mellitus and Continuous Subcutaneous Insulin Infusion Therapy: A Case Report

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Background: Neonatal diabetes mellitus (NDM), a rare condition, may be transient (TNDM) or permanent (PNDM). Published data describing its management are sparse. A novel approach gradually gaining acceptance, but rarely published in the literature, is use of continuous subcutaneous insulin infusion (CSII) with rapid-acting insulin analogues.
Objective: To demonstrate successful CSII use in a patient with TNDM.
Methods: NDM was diagnosed when a child presented with ketoacidosis at 7 weeks of age. Genetic testing revealed a paternally derived duplication in the 6q24 region, a mutation commonly seen in TNDM. IV insulin infusion was initially started using regular human insulin. The child was subsequently switched to CSII (Medtronic 515) after 24 hours with insulin aspart 100 U at 0.05 units/kg/hr, with premeal boluses of 0.2 U/15 min per 15 minutes breastfeeding (equivalent to 1.07 U/kg/day), plus corrective boluses of 0.1 U for blood glucose (BG) of 301 to 400 mg/dL and 0.2 U for BG of >400 mg/dL.
Results: The patient was discharged after 1 week, with BG control between 200+ and 300+ mg/dL. Glycosylated hemoglobin (A1C) level decreased from 8% to 6.7% 3 weeks after CSII initiation. No significant hypoglycemia was noted. Insulin requirements declined over the next 3 months, and insulin therapy was stopped when the child was 4 months old. At age 9 months the child was doing well, and his last A1C level was 5.4%.
Conclusion: CSII appears to be an effective alternative to SC insulin injections for patients with NDM.

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49 Thyroid Function Tests at Diagnosis of Diabetes Mellitus: Abnormalities and Association with Disease Severity

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Background: Routine screening for thyroid disease is advocated in patients with diabetes mellitus (DM) because DM is associated with autoimmune endocrinopathies.
Objective: To characterize abnormalities in thyroid function tests (TFTs) as they relate to DM severity at diagnosis.
Methods: We reviewed TFTs (thyroid-stimulating hormone [TSH], thyroxine [T_4], free T_4) and biochemical markers of disease severity (pH, bicarbonate, glycosylated hemoglobin [A1C] level, and blood glucose [BG] level) collected within 24 hours of DM diagnosis for patients treated in our hospital between December 2002 and August 2005. T_4 levels were converted to z-score (T_{4z}) based on normative data.
Results: TSH levels in 420 patients (aged 9 months to 18 years) and T_{4z} in 391 patients were included in the analysis. Although TSH did not correlate with biochemical markers, T_{4z} showed correlations with pH (r = 0.46), bicarbonate (r = 0.45), glucose (r = –0.28), and A1C level (r =–0.22; $P < 0.001$ for all). Abnormal TFT values (>2 SD from the norm) were found in 109 (26%) patients. Of these, 52 (47.7%) had a pattern of sick euthyroid (24 with isolated low T_{4z}, 18 with isolated low TSH, and 10 with both low TSH and T_{4z}) and 41 (37.6%) had compensated hypothyroidism (high TSH with normal T_{4z}). Only 6 patients had overt hypothyroidism, and 2 had hyperthyroidism. Compared with patients with normal TFT, those with sick euthyroid had lower mean pH (7.19 ± 0.02 vs 7.34 ± 0.01; $P < 0.001$) and bicarbonate (12.8 ± 1.0 vs 20.8 ± 0.3 mmol/L; $P < 0.001$) and higher mean BG (715 ± 53 vs 453 ± 12 mg/dL; $P < 0.001$) and A1C (11.1 ± 0.3 vs 10.5 ± 0.1%; $P < 0.05$) levels. In contrast, those with compensated or overt hypothyroidism were not different from patients with normal TFTs except for a lower bicarbonate in hypothyroidism (15.0 ± 3.0 vs 20.8 ± 0.3 mmol/L; $P < 0.05$). When compared with patients with type 2 DM, patients with type 1 DM had a greater incidence of abnormalities (27.5% vs 15%; $P = 0.05$). In the 26 patients who had sick euthyroid and longitudinal data, 92% of the abnor-

malities resolved.

Conclusion: Although abnormal TFTs are present in 25% of patients at diagnosis of DM, true thyroid dysfunction is rare (especially in patients with type 2 DM). The most common abnormalities were compensated hypothyroidism and sick euthyroid, but only the latter was correlated with DM severity at presentation. Limited longitudinal data suggest that most abnormalities consistent with sick euthyroid resolve without thyroid medication.