Connie Duncan

Case Study #23

Due October 23, 2012

1. What is the difference between type 1 diabetes mellitus and type 2 diabetes mellitus?

Type 1 diabetes mellitus is a genetic disorder that is characterized by an absolute deficiency of insulin due to the destruction of pancreatic beta cells, resulting in the inability of cells to use glucose for energy. By the time the clinical symptoms occur, 60%-80% of beta cells have been destroyed. Cells that produce glucagon, somatostatin, and pancreatic polypeptide are typically conserved but may be redistributed within the islets. Individuals with type 1 diabetes mellitus are usually lean, under 30 years of age at diagnosis, and will be dependent on exogenous insulin to prevent ketoacidosis and death.

People with type 2 diabetes mellitus produce insulin, but their tissues are insulin resistant. This causes an increased need for insulin, to the pancreas increases production. Eventually, over time, the pancreas loses its ability to produce insulin because it gets worn down. Consequently, two metabolic defects are observed in individuals with type 2 diabetes mellitus: insulin resistance and insulin deficiency. Although insulin resistance develops many years before onset of diabetes in individuals with a predisposition to type 2 diabetes mellitus, clinical onset is correlated with the diminishing pancreatic release of insulin. Individuals with type 2 diabetes mellitus are usually over 30 years of age at the time of diagnosis, and may require insulin for adequate glucose control.

1. How would you clinically distinguish between type 1 diabetes mellitus and type 2 diabetes mellitus?

Although such evidence is not concrete, physicians can distinguish between type 1 and type 2 diabetes mellitus on the following patient:

|  |  |
| --- | --- |
| **Type 1 Diabetes Mellitus** | **Type 2 Diabetes Mellitus** |
| Usually lean | Usually obese |
| Less than 30 years of age | More than 30 years of age |
| Dependent on exogenous insulin to prevent ketoacidosis and death | May require insulin for adequate control |

\*Please note that due to the increased obesity epidemic in the United States, many people that are diagnosed with type 2 diabetes may be well under the age of 30.

Sometimes autoantibodies can sometimes be used to distinguish between type 1 and 2 diabetes mellitus. For example, glutamic acid decarboxylase autoantibodies (GADA), islet cell autoantibodie (ICA), insulinoma-associated-2 autoantibodies that indicate a person has type 1 diabetes mellitus. Though a person does not always have all or any of autoantibodies, one or more autoantibodies are present in 85%-89% of individuals diagnosed with type 1 diabetes mellitus. If they are present they can be useful in distinguishing between type 1 and 2 diabetes mellitus.

Also, C-reactive protein (CPR), which is a negative acute phase respondent protein that is released during periods of inflammation and infection, can help distinguish between type 1 and 2 diabetes mellitus. Usually, in type 1 CPR is not present, while in type 2 it is present.

3. What are the risk factors for development of type 2 diabetes mellitus? What risk factors does Mrs. Douglas present with?

Mrs. Douglas has several risk factors that put her at risk for type 2 diabetes mellitus which include: older age, obese, family history of diabetes (older sister), sedentary lifestyle, impaired glucose metabolism, Race/ethnicity (African/American).

4. What are the common complications associated with diabetes mellitus? Describe the pathophysiology associated with these complications, specially addressing the role of chronic hyperglycemia.

Macrovascular Complications:

* Cardiovascular disease (CVD) is a disease of the heart and blood vessels, i.e., atherosclerosis. Diabetes is an independent risk factor for macrovascular disease in addition to the common coexisting risk factor for HTN and dyslipidemia. HTN is not only a major risk factor for CVD, but also a complication for microvascular complications such as retinopathy and nephropathy. In type 2 diabetes mellitus, hypertension may manifest as part of the metabolic syndrome, which is accompanies by high rates of CVD. The metabolic syndrome is a constellation of metabolic risk factors, including abdominal obesity, insulin resistance, dyslipidemia, HTN, and prothrombotic state.

Microvascular complications:

* Nephropathy occurs in 20%-40% of individuals with diabetes and is the single leading cause of chronic kidney disease (CKD). Kidney failure must be treated with dialysis or transplantation. Chronic hyperglycemia is associated with neuropathy because a lot of sugar, along with water, is being lost in the urine. Dehydration occurs as a result, which leads to low blood volume, then to the peripheral circulatory failure and eventually renal failure.
* Retinopathy is a frequent cause of blindness. In addition, other eye ailments, including glaucoma and cataracts occur in patients with diabetes prior to blindness. In patients with chronic hyperglycemia, dehydration occurs as a result of so much glucose, as well as water, being lost in the urine. This then results in decreased blood volume, leading to periheral circulatory failure which, includes the small blood vessels associated with the eyes.

Nervous System Diseases:

* Autoimmune Neuropathy is the loss of nerve function or poor circulation in the extremities which can lead to undetected injury and/or infection, gangrene, and amputation. Autoimmune neuropathy can also cause delayed gastric emptying with symptoms such as early satiety, nausea, and vomiting, weight loss, and poor glucose control. Chronic hyperglycemia is associated with this complication of diabetes since so much sugar is being lost in the urine and water is following with the sugar, this causes dehydration. As a result of dehydration cellular shrinkage occurs with leads to nervous system malfunctions.

5. Does Mrs. Douglas present with any complications of diabetes mellitus? If yes, which ones?

Mrs. Douglas presents with several complications of diabetes mellitus, some short term as well as long term complications. The short term complication that Mrs. Douglas is displaying is hyperglycemia, as evidence by her blurred vision and delayed healing of her foot, as well as her blood glucose level of 325 mg/dl.

As for long-term complications, Mrs. Douglas shows symptoms of all four complications: CVD, retinopathy, nephropathy, and neuropathy. Mrs. Douglas HTN (BP 150/97) could be attributed to CVD, blurred vision with retinopathy, frequent bladder infections to neuropathy, and her delayed wound healing and slight numbness and tingling in her feet to neuropathy.

6. Identify as least four features of the physician’s physical examination as well as her present signs and symptoms that are consistent with her admitting diagnosis. Describe the pathophysiology that might be responsible for each physical finding.

|  |  |
| --- | --- |
| **Physical Finding** | **Physiological Change/Etiology** |
| BP 150/90 | CVD disease |
| Dry Mucous Membranes | Dehydration |
| Unhealed wound | Hyperglycemia |
| Blurred vision | Hyperglycemia |

7. Prior to admission, Mrs. Douglas had not been diagnosed with diabetes mellitus. How could she present complications?

Although Mrs. Douglas was just diagnosed, she could already have complications associated with diabetes because prior to diagnosis, these symptoms may not have been severe enough to indicate diabetes. Persons with type 2 diabetes may or may not experience classic symptoms, due to gradual development of hyperglycemia and the hyperglycemia not being sever enough in its early stages. Types 2 diabetes mellitus often can go undiagnosed for many years, so she has most likely had diabetes for a long time, long enough to develop chronic complications.

12. Calculate Mrs. Douglas’s BMI

BMI = (body weight in kg) / (height in M) ^2

Weight= 155 lbs/ 2.2= 70.5 kg

Height= 5 ft= 60 in x 2.54 cm/1 m= 152.4 cm = 1.52 m

BMI= (70.5 kg) / (1.52 m) ^2= 30.5

13. What are the health implications for a BMI in this range?

A BMI in this range puts Mrs. Douglas in the obesity class 1 category. Mortality rate significantly increases with a BMI great than 30. Adverse health risks associated with obesity include: CVD, HTN, T2DM, gall bladder disease, sleep apnea, certain cancers, osteoarthritis, non-alcoholic fatty liver, and CVA (stroke).

14. Calculate Mrs. Douglas’s energy needs using the Harris-Benedict equation.

% IBW= Actual body wt. / IBW x 100

% IBW: 70.5 kg/45.5 kg x 100= 155%

Mrs. Douglas is 55% overweight. Since Mrs. Douglas has a BMI over 30 we must use the adjusted body weight for the Harris-Benedict equation.

ABW= [ {current BW-IBW} x.025]; [{70.5kg-45.5kg} x 0.25]= 51.8 kg

655.1 + 9.6 (51.8 kg) + 1.9 (152 cm)- 4.7 (71)= 1100 kcal/day

1100 kcal (1.2)= 1320 kcal

15. Calculate Mrs. Douglas’s protein needs.

51.8 kg (1.2 g)= 62 g protein/day

51.8 kg (1.5 g)= 78 g protein/day

Mrs. Douglas needs between 62-78 g protein/ day to help with the wound healing on her foot.

16. Is the diet order 1,200 kcal appropriate?

No, because the amount of kcal/day will not be enough for Mrs. Douglas to get her required amounts of nutrients per day, such as protein, which is necessary for wound healing.

19. Using www.calorieking.com Calculate kacls, protein, fat, and CHO.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TIME** | **Food** | **Kcal** | **Protein (g)** | **Fat (g)** | **CHO (g)** |
| **AM** | One egg, fried in bacon fat | 204 | 6.3 | 19.3 | 0.6 |
| **AM** | 2 strips of bacon or sausage | 92 | 6 | 7 | 0.2 |
| **AM** | 1 cup of coffee, black | 2 | 0.3 | 0 | 0 |
| **AM** | ½ cup of OJ (unsweetened) | 60 | 1 | 0 | 14 |
| **Lunch** | Lunchmeat sandwhich: 2 slices of enriched white bread, 1 slice (1 oz) of bologna, 1 slice (1oz) American Cheese, mustard | 330 | 13.3 | 18.5 | 27.3 |
| **Lunch** | 1 glass (8oz) iced tea unsweetend | 0 | 0 | 0 | 0 |
| **PM** | 1 cup of turnip greens seasoned with fatback, salt & pepper | 393 | 4.6 | 40 | 6.3 |
| **PM** | 2 small potatoes w/salt & pepper | 60 | 1 | 0 | 13 |
| **PM** | 2-in square of cornbread w/1 tbsp butter | 235 | 5 | 12 | 28 |
| **PM** | 1 cup of beans & ham | 202 | 15.6 | 3 | 29 |
| **Snack** | 2 vanilla wafers | 35 | 0 | 1.5 | 5 |
| **Totals** |  | **1615** | **53.4** | **101.3** | **123.4** |

20. How would you compare Mrs. Douglas’s “usual” dietary intake to her current nutritional needs?

Mrs. Douglas’s usual dietary intake is not coinciding with her current nutritional needs. While she is consuming only slightly more kcals per day than she should be, more than half of her kcal are from fat. Diabetics should get about 20%-30% of their kcal from fat, but this could be up to 40% if the fats being consumed are healthy ones. Mrs. Douglas seems to be consuming primarily saturated fats. Due to the fact that Mrs. Douglas is consuming most of her kcal from fat, this displaces other foods in her diet. Mrs. Douglas should be getting 45%-65% of her kcal from CHO’s, but she is only getting 31% of her kcal from CHO’s. However, Mrs. Douglas not getting enough protein to heal the wound on her foot. As calculated earlier Mrs. Douglas should be getting around 62-78 grams of protein/day.

22. Identify the two lab values that should be monitored regularly.

Mrs. Douglas should have her glucose and hemoglobin A1C monitored regularly.

30. Select two high-priority nutrition problems and complete the PES statement for each.

* Excessive saturated fat intake related to intake of animal fats as evidenced by 101.3 g of saturated fat intake per day, well beyond the 20%-30% recommendations.
* Inadequate protein intake related to infrequent consumption of carbohydrates compared with the recommended 45%-65% for a diabetic.

31. What was the most important nutritional concern when the patient was originally admitted to the hospital (time of Dx)?

Mrs. Douglas came in with a wound on her foot that would not heal, so the first nutritional concern is making sure she gets enough protein to heal the wound. She was also diagnosed with type 2 diabetes so our second concern would be to get her blood sugar under control and put her on a modified diet.

33. For each of the PES statements that you have written, establish an ideal goal, (based on signs and symptoms) and an appropriate intervention (based on etiology).

* Excessive saturated fat intake related to intake of animal fats as evidenced by 101.3 g of saturated fat intake per day, well beyond the 20%-30% recommendations.

Interventions:

A. Food/Nutrient delivery: restrict saturated and trans fats and stabilize kcals

B. Nutrition education: Teach Mrs. Douglas about the healthy fats that she can substitute for saturated fats.

* Inadequate protein intake related to infrequent consumption of carbohydrates compared with the recommended 45%-65% for a diabetic.

Interventions:

1. Food/Nutrient Delivery: increase CHO intake/ distribute evenly throughout the day; may even include a 10 pm and 2 pm snack to stabilize blood sugar levels throughout the day.
2. Nutrition Education: Teach Mrs. Douglas how to obtain healthy whole grains and increase the intake. Also timing her meals out so her blood sugar stays within a certain range throughout the day.