In The Name Of God

Islamic Azad University

College of Medicine

Thesis:

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Subject:

Association of skin infections in diabetics with HbA1C and response to Antibiotic-Therapy, Tehran 2007-8

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موضوع :

بررسی رابطه بین عفونتهای پوستی در بیماران دیابتی با HbA1C و میزان پاسخ به درمان آنتی بیوتیکی در بیماران مراجعه کننده به بیمارستان بوعلی در سال ۸۶ و ۸۷

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LIST

Association of skin infections in diabetics with HbA1C and response to Antibiotic-Therapy, Tehran 2007-8

Current study was performed as a descriptive-analytical cross-sectional survey to evaluate the association of skin infections with HbA1C and response to Antibiotic-Therapy in diabetics attending to Booali Hospital of Tehran during 2007-8. Fifty-four patients with type-2 diabetes mellitus who respected the inclusion criteria were enrolled. Their mean age was 63.1±12.27 years. Fifty patients (92.6%) were male and 4 subjects (7.4%) were female. Of 54 patients, 3.7% had gram-positive, 5.6% had gram-negative, 22.2% had anaerobic, and 68.5% had mixed skin infections. Mean HbA1C level was 7.69±1.8 g/dl. Thirty-six patients (66.7%) had therapeutic response. There was a statistically significant association between contributing germ of skin infection and therapeutic response in patients and those with mixed germs had least response (P=0.006). But the level of HbA1C was not related to contributing germ of the skin infections (P > 0.05).

Keywords: Diabetes Mellitus, Skin Infection, Treatment

Introduction

Diabetes mellitus is a chronic disease that requires long-term medical attention both to limit the development of its devastating complications and to manage them when they do occur. It is a disproportionately expensive disease; in 2002, the per-capita cost of healthcare was $13243 for people with diabetes, while it was $2560 for those without diabetes. However determining and treating the conditions leading to worse quality of life may result in a lower charge and better life for affected patients.

One of the most common problems among diabetic patients is skin infections. These infections are usually accompanied with numerous complications especially limb amputation. Therefore treatment of such infections and recognition of contributing factors for therapeutic response is an issue of importance and also necessary. Hence, current study was performed to evaluate the association of skin infections with HbA1C and response to Antibiotic-Therapy in diabetics attending to Booali Hospital of Tehran during 2007-8.

Review of Literatures

Pathophysiology

Type 2 diabetes mellitus was once called adult-onset diabetes. Now, because of the epidemic of obesity and inactivity in children, type 2 diabetes mellitus is occurring at younger and younger ages. Although type 2 diabetes mellitus typically affects individuals older than 40 years, it has been diagnosed in children as young as 2 years of age who have a family history of diabetes.

Type 2 diabetes is characterized by peripheral insulin resistance with an insulin-secretory defect that varies in severity. For type 2 diabetes mellitus to develop, both defects must exist: all overweight individuals have insulin resistance, but only those with an inability to increase beta-cell production of insulin develop diabetes. In the progression from normal glucose tolerance to abnormal glucose tolerance, postprandial glucose levels first increase. Eventually, fasting hyperglycemia develops as inhibition of hepatic gluconeogenesis declines.

About 90% of patients who develop type 2 diabetes mellitus are obese. Because patients with type 2 diabetes mellitus retain the ability to secrete some endogenous insulin, those who are taking insulin generally do not develop DKA if it is stopped. Therefore, they are considered to require insulin but not to depend on insulin. Moreover, patients with type 2 diabetes mellitus often do not need treatment with oral antidiabetic medication or insulin if they lose weight or stop eating.

Maturity-onset diabetes of the young (MODY) is a form of type 2 diabetes mellitus that affects many generations in the same family with an onset in individuals younger than 25 years. Several types exist. Some of the genes responsible can be detected by using commercially available assays.

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. GDM is a complication in approximately 4% of all pregnancies in the United States, though the rates may be 1-14% depending on the population studied.

Untreated GDM can lead to fetal macrosomia, hypoglycemia, hypocalcemia, and hyperbilirubinemia. In addition, mothers with GDM have increased rates of cesarean delivery and chronic hypertension. To screen for GDM, a 50-g glucose screening test should be done at 24-28 weeks of gestation. This is followed by a 100-g, 3-hour oral glucose tolerance test if the patient's plasma glucose concentration at 1 hour after screening is greater than 140 mg/dL.

Frequency

United States

In 2005, people with diabetes were estimated to account for 7% of the US population, or approximately 20.8 million people. Of these 20.8 million people, 14.6 million have a diagnosis of diabetes, and diabetes is undiagnosed in another 6.2 million. Approximately 10% have type 1 diabetes, and the rest have type 2. Additionally, an estimated 54 million people have pre-diabetes. Pre-diabetes, as defined by the American Diabetes Association, is that state in which blood glucose levels are higher than normal but not high enough to be diagnosed as diabetes.

Mortality/Morbidity

The morbidity and mortality associated with diabetes are related to the short- and long-term complications. Complications include the following:

- Hypoglycemia and hyperglycemia

- Increased risk of infections

- Microvascular complications (eg, retinopathy, nephropathy)

- Neuropathic complications

- Macrovascular disease (eg, coronary artery disease, stroke)

Diabetes is the major cause of blindness in adults aged 20-74 years, as well as the leading cause of nontraumatic lower-extremity amputation and end-stage renal disease (ESRD).

Race

Type 2 diabetes mellitus is more prevalent among Hispanics, Native Americans, African Americans, and Asians/Pacific Islanders than in non-Hispanic whites.

Sex

The incidence is essentially equal in women and men in all populations.

Age

- Type 2 diabetes mellitus is becoming increasingly common because people are living longer, and the prevalence of diabetes increases with age.

- It is also seen more frequently now than before in young people, in association with the rising prevalence of childhood obesity.

- Although type 2 diabetes mellitus still occurs most commonly in adults aged 40 years or older, the incidence of disease is increasing more rapidly in adolescents and young adults than in other age groups.

CLINICAL

History

Correctly determining whether a patient has type 1 or type 2 diabetes is important because patients with type 1 diabetes are dependent on a continuous source of exogenous insulin and carbohydrates for survival. Patients with type 2 diabetes may not need treatment for hyperglycemia during periods of fasting or decreased oral intake. A patient whose

diabetes is controlled with diet or an oral antidiabetic agent clearly has type 2 diabetes. A lean patient who has had diabetes since childhood, who has always been dependent on insulin, or who has a history of DKA almost certainly has type 1 diabetes.

Distinguishing the type of diabetes can be difficult in (1) patients who are treated with insulin and are young but clinically appear to have type 2 diabetes and (2) older patients with late onset of diabetes who nonetheless take insulin and seem to share characteristics of patients with type 1 diabetes. (This latter group is now said to have latent autoimmune diabetes of the adult [LADA]). When in doubt, treat the patient with insulin and closely monitor his or her glucose levels. Some adolescents or young adults, mostly Hispanic or African American patients, who present as with classic DKA are subsequently found to have type 2 diabetes.

Many patients with type 2 diabetes are asymptomatic, and their disease is undiagnosed for many years. Studies suggest that the typical patient with new-onset type 2 diabetes has had diabetes for at least 4-7 years before it is diagnosed. Among patients with type 2 diabetes, 25% are believed to

have retinopathy; 9%, neuropathy; and 8%, nephropathy at the time of diagnosis.

Pre-diabetes often precedes overt type 2 diabetes. Pre-diabetes is defined by a fasting blood glucose level of 100-125 mg/dL or a 2-hour post oral glucose tolerance test (OGTT) glucose level of 140-200 mg/dL. Patients who have pre-diabetes have an increased risk for macrovascular disease as well as diabetes.

Often confused with pre-diabetes is the metabolic syndrome (also called syndrome X or the insulin-resistance syndrome). Metabolic syndrome, thought to be due to insulin resistance, can occur in patients with overtly normal glucose tolerance, prediabetes, or diabetes. It is characterized by central obesity, then by dyslipidemia. Hypertension is a common feature. Eventually, clinically apparent insulin resistance develops. Unfortunately, insulin resistance is not measured clinically, except in research settings. An elevated fasting blood glucose level is the first indication of insulin resistance, but fasting insulin levels are generally increased long before this occurs. Measurement of fasting insulin levels are not yet

recommended for the diagnosis of insulin resistance. An effort to standardize insulin assays is underway and may allow for the use of fasting insulin levels to diagnose insulin resistance in the future.

During history taking, inquire about the type and duration of the patient's diabetes and about the care the patient is receiving for diabetes.

- Type and estimated duration of diabetes: This information helps to determine if the patient is insulin dependent. The diagnosis is based on history, therapy, and clinical judgment, as described above.

- Diabetes care: Inquire about the patient's current treatment of diabetes and about his or her usual blood glucose levels based on self-monitoring and/or recent measurements of hemoglobin A_{1C} (A_{1C}, an indicator of long-term glucose control).

A focused diabetes history should include the following questions:

- Is the patient's diabetes generally well controlled (with near-normal blood sugar levels)? Patients with poorly controlled blood glucose levels heal more slowly and are at increased risk for infection and other complications.

- Does the patient have severe hypoglycemic reactions? If the patient has episodes of severe hypoglycemia and therefore is at risk for losing consciousness, this possibility must be addressed, especially if the patient drives.

- Does the patient have peripheral neuropathy?

- Does the patient have any unrecognized foot ulcers or lesions that need treatment?

- Does the patient have diabetic nephropathy that might alter use of medications or intravenous radiographic contrast material?

- Does the patient have macrovascular disease, such as coronary artery disease (CAD), that should be considered in the ED?

As circumstances dictate, additional questions may be warranted.

- Diabetes care

  - What is the patient's diet? Does he or she use oral antidiabetic agents, insulin, or both? If so, what are the doses and frequencies of the medications?

- Does the patient self-monitor his or her glucose levels? If yes, what is the frequency and the usual range of values at each time of day?

- When was the patient's A_{1C} level last measured? What was it?

- Does the patient adhere to a specific diet or exercise regularly?

- Hyperglycemia: Ask about polyuria, polydipsia, nocturia, weight loss, and fatigue.

- Hypoglycemia

  - Does patient have episodes of hypoglycemia? Are these episodes explicable? Are these episodes mild or severe?

  - Does the patient require the assistance of another person for treatment?

  - When and how often do these episodes occur? How does the patient treat them?

- o Does the patient have hypoglycemia unawareness (ie, does the patient lack the adrenergic warning signs of hypoglycemia)? Hypoglycemia unawareness indicates an increased risk of subsequent episodes of hypoglycemia.

- Microvascular complications

  - o Retinopathy: When was the patient's last dilated eye examination? What were the results? Any recent deterioration in vision?

  - o Nephropathy: Does the patient have known kidney disease? What were the results and dates of the last measurements of urine protein and serum creatinine levels? If urine protein has been negative to trace, has a microalbumin-to-creatinine ratio been assessed within the past year?

- Neuropathy: Does the patient have any history of neuropathy or symptoms of peripheral neuropathy or autonomic neuropathy (including impotence if the patient is male)?

- Macrovascular complications

- o Hypertension: Does the patient have hypertension (defined as a BP of >130/80 mm Hg)? What medications are taken?

- o CAD: Does the patient have CAD? Does the patient have a family history of CAD?

- o Peripheral vascular disease: Does the patient have symptoms of claudication or a history of vascular bypass?

- o Cerebrovascular disease: Has the patient had a stroke or transient ischemic attack?

- o Hyperlipidemia: What are the patient's most recent lipid levels? Is the patient taking lipid-lowering medication?

- Diabetic foot disease: Does the patient have a history of foot ulcers or amputations? Are any foot ulcers present?

- Infections: Are frequent infections a problem? At what site?

Physical

A diabetes-focused examination includes vital signs, funduscopic examination, limited vascular and neurologic examinations, and a foot

assessment. Other organ systems should be examined as indicated by the patient's clinical situation.

- Assessment of vital signs

  - o Is the patient hypertensive or hypotensive? Orthostatic vital signs may be useful in assessing volume status and in suggesting the presence of an autonomic neuropathy.

  - o If the respiratory rate and pattern suggest Kussmaul respiration, DKA must be considered immediately, and appropriate tests ordered.

- Funduscopic examination

  - o The funduscopic examination should include a careful view of the retina, including both the optic disc and the macula.

  - o If hemorrhages or exudates are seen, the patient should be referred to an ophthalmologist as soon as possible. Examiners who are not ophthalmologists tend to underestimate the severity of retinopathy, especially if the patients' pupils are not dilated.

- Foot examination

    o The dorsalis pedis and posterior tibialis pulses should be palpated and their presence or absence noted. This is particularly important in patients who have foot infections because poor lower-extremity blood flow can delay healing and increase the risk of amputation.

    o Documenting lower-extremity sensory neuropathy is useful in patients who present with foot ulcers because decreased sensation limits the patient's ability to protect the feet and ankles. This can be assessed with a monofilament, or more readily by assessment of reflexes, position, and vibration sensation.

    o If peripheral neuropathy is found, the patient should be made aware that foot care (including daily foot examination) is very important for the prevention of foot ulcers and lower-extremity amputation.