Management of Type 1 Diabetes

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KEYWORDS

• Type 1 diabetes • Glucose management • Insulin therapy • Autoimmune • Nursing

KEY POINTS

- Differentiation between type 1 and other types of diabetes is an integral part of competent nursing care.
- Immune related cancer therapy has been identified as a new and emerging causality for type 1 diabetes.
- Nurses are an important part of the diabetes care team and should be aware of diabetes complications.
- Insulin therapy options are expanding with the addition of new preparations.
- Mortality related to cardiovascular disease in type 1 diabetic patients remains higher than the general population.
- Close follow up with expert medical specialists is important in early detection and treatment of diabetes related complications.

INTRODUCTION

Type 1 diabetes, although much rarer than type 2 diabetes, is also becoming more prevalent. More is known about the possible causes of type 1 diabetes, and strategies to prevent the evolution of the disease are being developed. Clinicians should be aware of these changes and the current standards of care to provide complete care for patients with type 1 diabetes. This article discusses the epidemiology, pathophysiology, diagnosis, management strategies, and long-term outcomes of patients with type 1 diabetes.

EPIDEMIOLOGY

In the United States, an estimated 3 million individuals have type 1 diabetes.[1] Type 1 diabetes has been classically known as a childhood disease, with the peak age of diagnosis in the mid teenage years.[2] However, the larger proportion of individuals

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with type 1 diabetes are adults who have been living with diabetes since childhood or were diagnosed during adulthood.[1]

In the United States, type 1 diabetes accounts for 5% of all diabetes cases in adults.[2] The incidence of type 1 diabetes is increasing at a rate of 3% to 5% per year based on studies reviewed from the United States, Germany, Poland, and Italy.[3] There are several theories as to why this disease, considered primarily autoimmune related, is increasing in frequency. It is well established that genetic predisposition is a major factor in a person's risk of type 1 diabetes development; however, the increasing incidence suggests additional contributing factors. Researchers are exploring how a combination of genetic predisposition and interaction with environmental factors is responsible for the increasing rate of type 1 diabetes. Research is currently evaluating various environmental factors and how they may be influencing the development of diabetes. Infection, diet and body size, pollutants, gut flora, vitamin D exposure, geographic location, insulin resistance, and prenatal environment are all factors that are theorized to increase the risk of type 1 diabetes development; however, not all studies have found clear supportive evidence.[3]

PATHOPHYSIOLOGY

Most type 1 diabetes develops when the immune system attacks and destroys pancreatic β cells. This process results in progressive insulin deficiency leading to complete dependence on exogenous insulin.[2] Autoimmune markers can be detected in the blood of patients with this type of diabetes and can also be used for early detection of at risk family members. These markers include islet cell autoantibodies and autoantibodies to glutamic acid decarboxylase, insulin, protein tyrosine phosphatases (IA-2 and IA-2β), and zinc transporter protein (ZnT8).[4] The destruction of β cells can occur rapidly, as is typically seen in childhood diabetes, or more slowly leading to insulin dependence in adulthood.

Over the last decade, immune checkpoint inhibitors have been approved for the treatment of several cancers. Although rarely reported, new-onset type 1 diabetes is a rare side effect of some of these therapies. Recent review of case reports identified patients who presented with type 1 diabetes anywhere from 1 week to 7 months after initial treatment. In this review, some patients were found to have autoantibodies associated with type 1 diabetes whereas others were antibody negative.[5] Further research is needed to determine whether this variation of type 1 diabetes will be permanent and whether it should be treated differently than traditional type 1 diabetes.

Idiopathic type 1 diabetes is defined by periods of absence of insulin production without the presence of β-cell autoimmunity. This form of type 1 diabetes is strongly inherited and occurs most frequently in patients with African or Asian ancestry. The episodic nature of this disease put these patients at increased risk for diabetic ketoacidosis, and their insulin replacement requirements may vary or be intermittent.[4]

DIAGNOSIS

Differentiating between type 1 and 2 diabetes is important so that the patient can be optimally treated. The diagnosis should be made with a combination of data including clinical presentation, laboratory data, and family history. Ongoing re-evaluation of the diagnosis may be needed for patients who do not respond as expected to prescribed treatments.

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