

CASE STUDY

Improved A1 C Levels in a Patient with Insulin-Dependent Type I Diabetes Undergoing Chiropractic Care: A Case Report

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Abstract

Objective: To describe successful chiropractic care of a patient with Type I Diabetes.

Clinical Features: A 4-year-old female with Insulin-Dependent Type I Diabetes presented for a chiropractic evaluation. Initial examination revealed postural deviations and vertebral subluxations in the cervical, thoracic, and pelvic regions.

Intervention and Outcomes: The patient was seen a total of 24 visits. Gonstead technique protocol was followed to administer adjustments to reduce vertebral subluxations. There was a significant decrease in hemoglobin A1C levels which resulted in a lessening of insulin administration.

Conclusion: The chiropractic care of a pediatric patient with Insulin-Dependent Type I Diabetes is presented. More research is warranted on chiropractic care and diabetes.

Key Terms: *chiropractic, Type I diabetes, diabetes mellitus, subluxation, insulin*

Introduction

Many people worldwide are affected by Type I Diabetes, including 22 million adults and 0.4 million children.¹ The impact of diabetes-related complications on patients and healthcare is significant.¹ Type I diabetes mellitus results from beta cell destruction, usually leading to absolute deficiency in insulin. This chronic autoimmune disease requires self-management and medical care to reduce the risk of long-term complications.²

Recommendations of care for diabetic patients that favorably affect health outcomes include screening, diagnostic, and therapeutic actions. The purpose of this report is to describe

chiropractic in conjunction with allopathic and pharmacological care for a pediatric patient with diabetes. This report will discuss the beneficial effects she experienced while under chiropractic care.

Case Report

A four year old female was brought to a chiropractor by her parents with a pre-existing diagnosis of insulin-dependent type I diabetes. The condition was discovered when she was 2 years old. At the time of diagnosis, her hemoglobin A1C was 7.2%.

The patient's mother reported that her daughter was a healthy baby and breastfed for 12 months. She had never had any

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immunizations or childhood illnesses. According to Ziegler et al, reduced total or duration of breastfeeding did not significantly increase the risk of developing islet auto-antibodies.³ Islet auto-antibodies do not cause type I diabetes, but they serve as markers of the body's destructive immune response against pancreatic beta cells, which are the body's own cells that produce insulin.³

Her family history included a great aunt with Type I diabetes and a paternal grandfather with high blood pressure and elevated cholesterol. According to the American Diabetes Association: "Although the cause of type I diabetes isn't known, it is likely that genetic and environmental factors work together to trigger the immune system to destroy the insulin producing cells. Relatives of people with type I diabetes are at a 10 to 15 percent greater risk for developing the disease."²

Frequent urination and excessive thirst were the warning signs which prompted the patient's mother to call the pediatrician and have a blood glucose test. Type I diabetes occurs most often in children, but can occur at any age. Common symptoms include: excessive thirst, frequent urination, fatigue, hunger, weight loss, numbness in the feet, and blurry eyesight.²

When the patient was first diagnosed with type I diabetes, insulin injections were administered for 6 months as a preliminary treatment. The injections consisted of basal and prandial insulin which were administered 4-5 times daily. Within 6 months of diagnosis, the patient was put on a continuous subcutaneous insulin infusion (CSII, or insulin pump). When compared to multiple daily injections, continuous subcutaneous insulin infusion (CSII) has been found to give better control of glucose levels as reflected in hemoglobin A1C levels, fewer problems with hypoglycemia, and quality of life gains such as flexibility of lifestyle.⁴

Her mother checked her blood sugar on average six times per day. Patients are advised to check their blood glucose levels at least four times per day, especially before meals, bedtime, 12a.m., and 3a.m.⁵ The patient's mother reported that at the time of her daughter's diagnosis, before chiropractic care, she checked her daughter's blood glucose levels 3-4 times per night.

The patient's mother also reported that they have always eaten a healthy diet. Since the diagnosis, the endocrinologist recommended a diet rich in whole grains and fiber, low in carbohydrates, and lots of sugar free alternatives. This included eating whole grain alternatives whenever possible, lots of proteins, and fruits. The mother also advised high fat and highly processed foods have created the greatest problems for the patient causing her blood sugar levels to become unstable. As a result, she has avoided school foods and convenience foods.

Foods recommended by the American Diabetes Association include fruits, vegetables, whole grain carbohydrates over processed carbohydrates, low-fat dairy foods, and protein-rich foods to support healthy blood sugar levels.² Foods that should be avoided include refined carbohydrates, high sugar foods, saturated fats, and trans fats.²

Examination

Upon initial evaluation, posture analysis revealed anterior head translation (1") and high right shoulder (0.5").

X-rays revealed misalignments at C₂, C₆, T₆-T₉, L₅ with a listing of PR (+⊖Y), and pelvis with a listing of PI (-Z, -⊖X) in the left innominate and AS (+Z, +⊖X) of the right innominate. Upon motion and static palpation several areas revealed hypo-mobility, fixation, aberrant motion, pain, tenderness, and restriction.

Intervention & Outcomes

Intervention included Gonstead technique using contact-specific, high-velocity, low-amplitude adjustments.⁶ The listing of PI (-Z, -⊖X) in the left innominate was adjusted in the side posture position contacting the ilium. The listing of AS (+Z, +⊖X) of the right innominate was adjusted in the side posture position contacting the ischium. The C₂ and C₆ segments with a listing of PR (+⊖Y) were adjusted using Gonstead cervical chair. This adjustment used a posterior and inferior line of drive, while taking into account the angle of the cervical facets.⁶ The T₆-T₉ segments with a listing of PR (+⊖Y) were adjusted with the patient prone using a double-thenar move. This adjustment required contacting the left transverse process and stabilizing the opposite transverse process. L₅ had a listing of PR (+⊖Y) and was adjusted by contacting the mamillary process on the side of body rotation with the patient in the side posture position.

The patient was seen a total of 24 times over approximately two months. Chiropractic care was the only intervention used during that time in addition to the CSII and healthy nutritional choices. During the course of treatment, the patient experienced a decrease in hemoglobin A1C, going from 7.2% to 6.5%. She also had a decrease in the amount of insulin used each day. She went from needing 15 units of insulin a day to 11 units. Intensive treatment of type I diabetes often does not succeed in achieving target A1C levels less than 7.0%.⁷

Her mother reported that since starting chiropractic care, her daughter's blood sugar levels had been under much better control. She stated chiropractic has allowed the blood sugar levels to stay within a normal range. After 12 weeks of care, the patient went out of town for 7 days on vacation. During those 7 days, she did not get adjusted. Her mother reported that she had to administer 16 units of insulin, because her blood sugar was very unstable. When the patient returned from vacation, her mother resumed chiropractic care and after three adjustments during that week control of the patient's blood glucose levels was regained. This in turn stabilized the amount of insulin units administered per day.

The mother reported that the patient was sleeping better at night due to stable blood sugar levels. Her mother was also sleeping better as she no longer needed to wake her up in the middle of the night to check blood sugar levels as often. Her daughter now experienced blood sugar spikes so seldomly that she rarely had to get up to urinate at night. The mother reported the patient was now able to enjoy a normal, active,

and healthy lifestyle.

The patient is still undergoing chiropractic care to help maintain stability of her blood sugar levels. Her progress will be monitored through reassessments every three months.

Discussion

Type I diabetes mellitus can be diagnosed at any age, although mainly affecting children, adolescents, and young adults. The cause of type I diabetes is largely unknown; however, there is a strong genetic risk factor.⁸ Type I diabetes leads to complete cessation of insulin production by the pancreatic beta cells within a few years of diagnosis.⁸ Intense monitoring of blood sugar and continuous insulin therapy is required, especially in children. This is important because keeping blood sugar levels low helps prevent or delay chronic complications.⁸ Glycemic control in type I diabetes is a complex and demanding challenge day to day due to the need for frequent self-monitoring and regular adjustments in insulin dosing. These challenges have a substantial impact on quality of life and also on the healthcare costs needed for recommended treatment.⁹

Type I diabetic children in the United States have a high risk for acute complications, which are related to insufficient or excessive amounts of insulin. These major life-threatening complications are diabetic ketoacidosis, with a prevalence of 8 per 100 patients, and severe hypoglycemia, with a prevalence of 19 per 100 patients. It was found in a study of 1,243 children with type I diabetes, modifiable risk factors for these complications included patients with extremes of distribution of A1C levels, psychiatric disorders, and under-insured patients.¹⁰

Optimal blood glucose control is defined by a target hemoglobin A1C of less than 7%, meter readings of pre-prandial glucose level of 80 to 120 mg/dL, and a bedtime glucose level of 100-140 mg/dL. Patients should monitor their blood glucose levels several times throughout the day and before bedtime as well to maintain the target zone and avoid the onset of hypoglycemic events.¹¹

Treatment for type I diabetic children should involve assessing the effectiveness of the management plan on glycemic control by monitoring blood glucose levels at least four times per day. Also, treatment should include A1C testing at initial assessment and then as part of continuing care. A1C tests should be done two times per year in patients who have stable glycemic control, and four times per year in patients with new therapy or in patients who are not meeting glycemic goals. This is important because A1C reflects the average glycemia over several months and is a strong predictor for diabetes complications.¹²

Recommended therapies for the treatment of type I diabetes include either the use of multiple dose insulin injections (3-4 basal and prandial insulin injections/day) or continuous subcutaneous insulin infusion (CSII, or insulin pump).¹³ CSII is an effective treatment method for type I diabetes patients, regardless of age.¹³ These insulin pumps have revolutionized diabetes care for the past 30 years.¹³ And future advances in insulin pump technology will involve an artificial pancreas as

a viable treatment option for patients.¹³

Although insulin will likely always be needed for the survival of the patient, most type I diabetics seek chiropractic care to decrease complications and improve overall health. In a pilot survey of parents of type I diabetic children, it was found that Complementary and Alternative Medicine (CAM) was an adjunct to diabetes treatment plans in a significant number of type I diabetic children.¹⁴ The parents of these children generally do not initiate conversations on this information to their clinicians, but it is estimated that 11-54% of children in the U.S. have tried CAM.¹⁴ The range is wide due to the varying definitions of CAM. In this study, out of 14 types of CAM treatment, chiropractic care was used most frequently to treat children with type I diabetes.¹⁴

Chiropractic care is beneficial to diabetic patients because they tend to have more musculoskeletal complaints such as muscle cramps, stiffness, tenosynovitis, peripheral neuropathy, complex regional pain syndrome, neuropathic joints, carpal tunnel syndrome, adhesive capsulitis, diffuse idiopathic skeletal hyperostosis, Dupuytren's contracture, and vertebral compression fracture due to hypoglycemic convulsions.¹¹

The majority of research on chiropractic and diabetes has been in the form of case studies. These case studies suggest beneficial effects for diabetes patients, however more research needs to be done on chiropractic care and its effects on blood glucose levels in this patient population. One case study described a nine year old female with type I diabetes mellitus, hypothyroidism, and vertebral subluxations. She experienced a decrease in the amount of insulin needed and the frequency of hypoglycemic episodes. She also showed an improvement in her sleeping pattern.¹⁵

Another case study showed chiropractic care can offer type I diabetics significant lifestyle enhancement. After one month of care glucose, blood, and urine levels had normalized and remained stable.¹⁶ Stabilization of glucose levels were also achieved in a study performed on 6 subjects with diabetes who underwent upper cervical NUCCA chiropractic care.¹⁷

Vertebral subluxations have neurological effects on the body that may affect immune and visceral function.¹⁸ One model to describe these effects is the neurodystrophic model. This model suggests that neural dysfunction is stressful to body tissues and that this lowered tissue resistance may affect immune responses, possibly altering trophic function of the involved nerves.¹⁸

Welch suggests that neurophysiological pathways may have an autonomic effect which relates to the specific segment adjusted.¹⁹ Physiological reflex effects may be a way to explain this connection between altered mechanoreception and autonomic nervous system function.²⁰ More research done on the neurophysiological pathway and somatovisceral reflex could lead to better understanding of how chiropractic adjustments affect visceral function.

Another study focused on the stress response of the body, stated stress impairs the body's ability to correctly control body responses in patients with chronic disease. Chronic stress may influence patients' control of type I diabetes due to

the suppression of TSH and T3 which is associated with hyperinsulinemia and dyslipidemia.²¹ Chiropractic adjustments aim to restore homeostasis in the body, and balance of nociception and mechanoreception suggests a decrease in the stress response by regulating hormone secretions.^{15,18}

Chesnokova's mini-review stated "the nervous, endocrine, and immune systems are anatomically and functionally interconnected."²² The hypothalamus controls mechanisms that are needed to maintain the body's homeostasis and also control organ systems.²² This relates to Lumb's study which found that "transmission through viscerosomatic neurons in the thoracic spinal dorsal horn can be powerfully inhibited by descending pathways that originate in the anterior hypothalamus-preoptic area."²³ This may be linked to the somatovisceral reflex that has been suggested by chiropractors as a possible mechanism for management of disease.

More research needs to be done in this area on chiropractic spinal adjustments and its effect on autonomic and visceral function. This relationship between the viscera and spine could explain the positive outcomes chiropractic care has on diseases such as diabetes.

Conclusion

The case of a four year old female with type I diabetes was presented. Vertebral subluxations were identified and reduced concomitant with improvements in blood glucose levels. More peer-reviewed research studies need to be performed to confirm or deny the efficacy of chiropractic care and its effects on type I diabetes.

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