

Abstract

Type 1 Diabetes is an autoimmune disease that impacts insulin producing cells. It is a life-long condition that must be monitored closely and can have systemic complications left untreated. Management of Type 1 Diabetes require blood glucose monitoring and access to a multidisciplinary pediatric diabetes team. Considerations for dental treatment include recognizing and managing possible complications (hypoglycemic and hyperglycemic episodes). Advanced considerations and guidelines should be addressed for dental treatment with sedation or general anesthesia. This case report details the assessment and dental treatment for a 4-year-old male with Type 1 Diabetes.

Background

Type 1 Diabetes is an endocrine and metabolic condition where the immune system destroys insulin-producing beta cells of the pancreas, thus causing a complete insulin deficiency. These individuals are unable to regulate blood glucose levels and are often in a state of hyperglycemia.

Different than Type 2 Diabetes which is caused by an insufficient production or resistance of insulin, Type 1 Diabetes is often diagnosed in childhood and has no obesity component.

Type 1 Diabetes accounts for 98% of diabetes cases in children <10 years old and is found in 1 in every 400 to 600 children. There are more than 13,000 children diagnosed every year. It has no gender or ethnic distribution.

Etiology: There is an unknown environmental trigger with genetic susceptibility (changes in chromosome 6).

Diagnosis: Laboratory confirmation is required

- Classic symptoms of hyperglycemia or hypoglycemia crises with random plasma glucose of >200 mg/dL
- Fasting plasma glucose >126 mg/dL (at least 8 hours)
- A1C > 6.5%

Long term HbA1c goal: < 7%

Hypoglycemia

Described when blood glucose levels are low: <80 mg/dL (1-5 years old) and <70 mg/dL (6+ years old)

Symptoms:

- Irritable, shaky, anxious behavior or sleepiness
- Sweating, hunger

Common causes:

- Excessive insulin, missing meals, exercise

Management of mild to moderate hypoglycemia:

- 15-15 rule: 15 g of rapidly absorbed simple carbohydrates (glucose tablets, sugar) and blood glucose levels should raise in 15 minutes

Management of severe hypoglycemia:

- Intramuscular or intranasal glucagon

Hyperglycemia

Described when blood glucose levels are >125 mg/dL while fasting or 180 mg/dL two hours postprandial

Symptoms:

- Constant hunger
- Increased thirst and urine output

Systemic complications:

- Retinopathy
- Nephropathy
- Coronary heart disease

Treatment:

- Administration of rapid-acting insulin
- Postprandial spikes of hyperglycemia are normal

Diabetic Ketoacidosis:

- Hyperglycemia, ketosis, and metabolic acidosis
- Clinical signs: dehydration, smell of ketones (fruity nail polish remover), lethargy, and drowsiness
- Treatment: requires hospitalization and admission

Management

- **Insulin:** multiple daily injections or continuous pump
 - Rapid acting: often before a meal, multiple
 - Long acting: often in the morning
- **Blood glucose monitoring:** multiple times a day
- Healthy diet
- Physical activity

Dental Findings

- **Decreased salivary flow:** due to dehydration and changes in salivary glands from insulin deficiency
- **Increased risk for caries:** due to salivary hypofunction, shifts in oral flora, and increased levels of carbohydrates in saliva
- **Delayed wound healing:** decline in innate immunity
- **Increased risk for infections:** decreased salivary flow, impaired chemotaxis
- **Additional findings:** increased gingivitis and periodontitis, xerostomia, taste dysfunction, oral candidiasis
- **Increased risk after extractions:** prophylaxis antibiotics may be indicated in non-controlled diabetes

Treatment Considerations

- **Morning appointments,** with breakfast and medications prior, are encouraged: cortisol levels are higher
- **Recognize** signs and symptoms of hypoglycemic and hyperglycemic episodes and how to treat
- **Positioning:** patient may have an insulin pump or blood glucose sensor; avoid displacing
- **Diet instructions** may be altered after treatment, adhere to diet and blood glucose guidelines
- **If sedation is indicated** for dental treatment, consider NPO guidelines and requirement of blood glucose monitoring throughout

Case Report

4 year 0-month male presented to Mott Children's Health Center for an examination

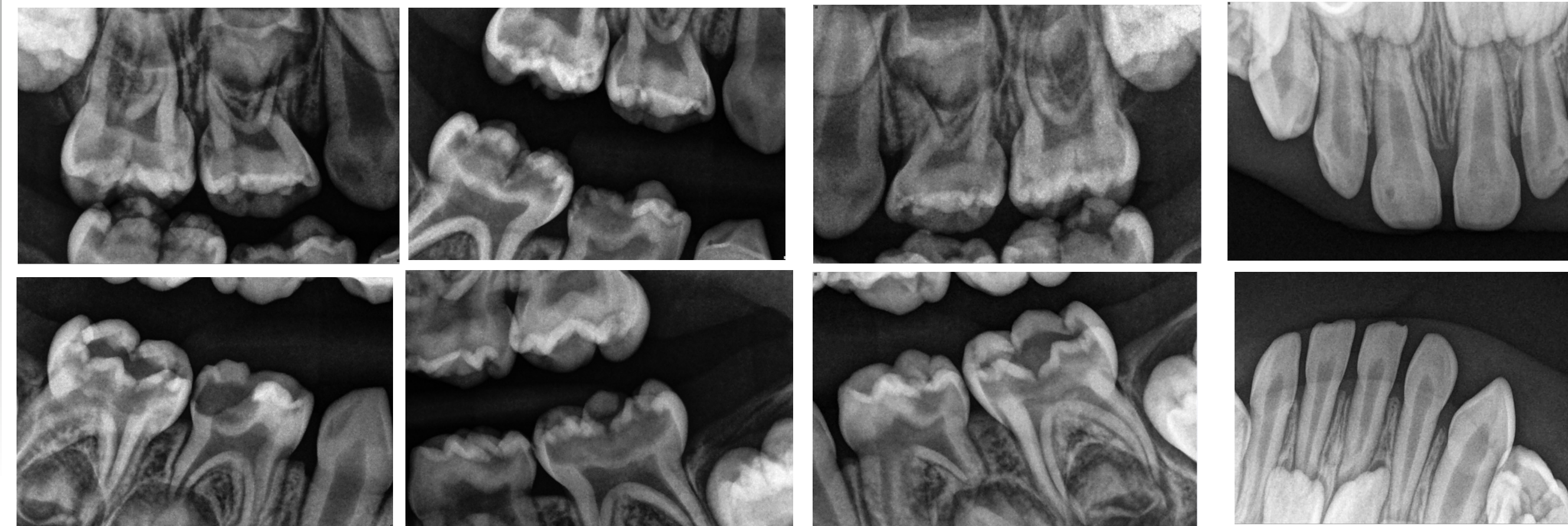


- **Health history:** Type 1 Diabetes (recently diagnosed)
- **Medications:** Lantus (morning, long-acting), Humalog (after each meal, fast acting)
- **Allergies:** NKA
- **Monitoring:** Patient's mother uses her own glucometer
- **Family history:** no history of diabetes
- **Social history:** lives with mother



Chief concern: Pain on the lower left and right for the past few weeks that keep him up at night

Exam findings: Caries detected on #A-o, #B-o, #D-f, #E-l, #G-fl, #I-o, #J-o, #K-ol, #L-o, #S-dol, and #T-o



Treatment plan: Full mouth rehabilitation under general anesthesia due to extent of treatment plan, medical history, and behavior

Medical consultation from Endocrinologist:

- Reduce Lantus 1.5 units the night prior
- 101- 240 mg/dL: proceed with anesthesia, IV fluids without dextrose, check blood glucose hourly
- <100 mg/dL: IV fluids with dextrose, check hourly
- Additional recommendations for extremely high and low blood glucose levels also included

Monitoring of blood glucose levels during treatment:

- Morning of procedure: 206 mg/dL
- Prior to procedure: 121 mg/dL
- Start of procedure: 106 mg/dL
 - Administration of Dextrose
- End of procedure: 117 mg/dL
- After the procedure: 95 mg/dL
 - Administration of Dextrose
- Prior to discharge: 137 mg/dL

Treatment completed:

- Stainless steel crowns: #A, #B, #I, #J, #L, #S
- Composite restorations: #D, #E, #G
- Extractions: #K, #T
- Gelfoam placed in #K and #T sockets

Outcomes assessment:

- High caries risk due to previous caries experience, existing restorations, teeth missing due to caries, diet, medical condition
- Increase frequency of recall visits
- Future treatment is dependent on behavior and extent of treatment and will continue to include blood glucose monitoring

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