UT Health San Antonio
School of Dentistry
Department of Oral & Maxillofacial Surgery

Project ECHO

Felix Amarista, DDS

Assistant Professor

Dept. Oral and Maxillofacial Surgery

Isla de Margarita
Venezuela

Caracas, Venezuela

Caracas
Venezuela

Bogota, Colombia

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Objectives

1. Review the **pathophysiology of diabetes** and associated risk factors.
2. Comprehend the importance of **patient evaluation and risk assessment**.
3. Identify the **risk associated with different oral surgery procedures** and the patient with diabetes.
4. Review the **complications of diabetes** and its manifestations.

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Introduction

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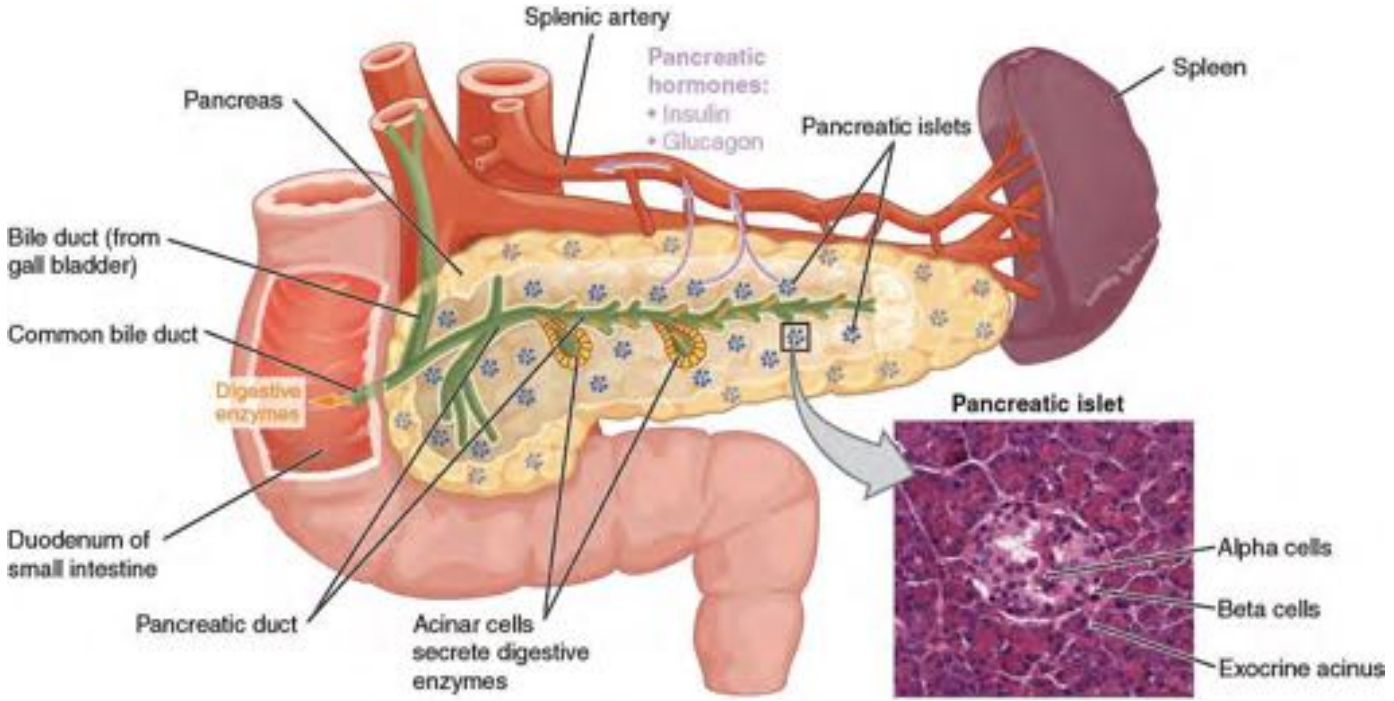
Diabetes

ˌdīəˈbēdēz, ˌdīəˈbēdis



A disease in which the body's ability to produce or respond to the hormone insulin is impaired, resulting in abnormal metabolism of carbohydrates and elevated levels of glucose in the blood and urine.

Simpson, J. A., Weiner, E. S. C., & Oxford University Press. (1989). The Oxford English Dictionary.

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History

2nd Century BC

Aretaeus of Cappadocian

First accurate description of diabetes

17th Century

Thomas Willis

Term mellitus to describe the extremely sweet taste of the urine

19th Century

Claude Bernard

Discovery of the glycogenic action of the liver

19th Century

Minkowski & von Meering

Disease of the pancreas

20th Century

Banting, Best and Macleod

Discovery of Insulin

2022

Karamanou M, Protogerou A, Tsoucalas G, Androutsos G, Poulakou-Rebelakou E. Milestones in the history of diabetes mellitus: The main contributors. World J Diabetes. 2016 Jan 10;7(1):1-7.

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More than **450 million** people worldwide have diabetes mellitus.

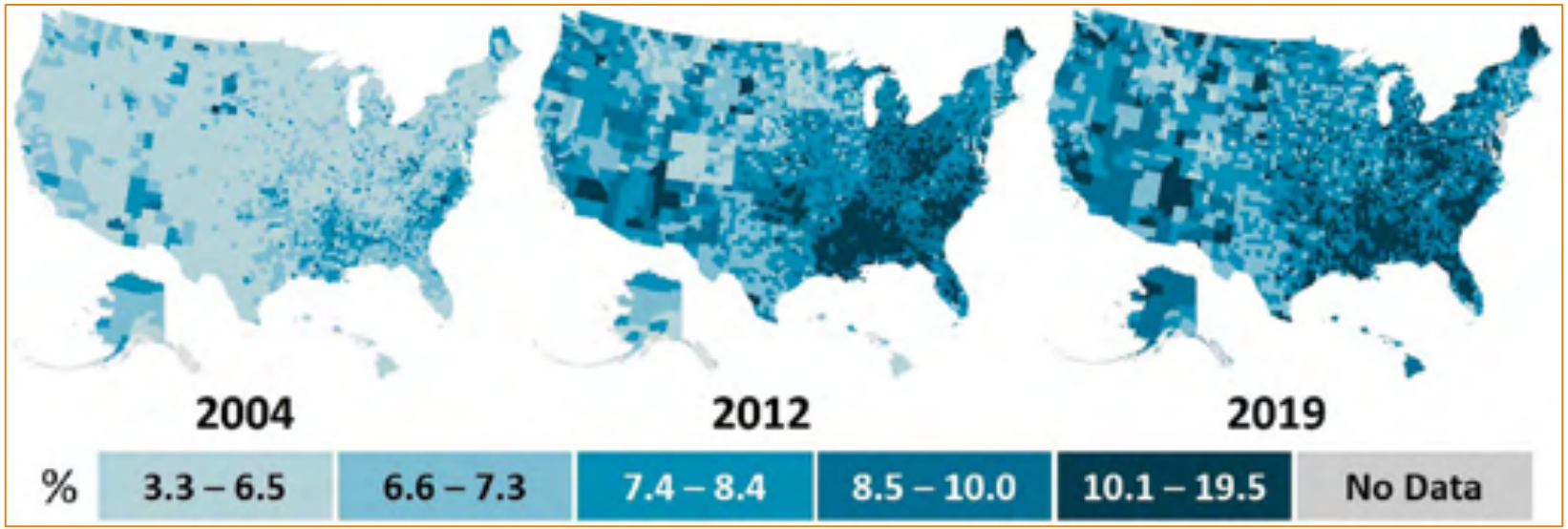
Fast Facts on Diabetes

Diabetes

- **Total:** 37.3 million people have diabetes (11.3% of the US population)
- **Diagnosed:** 28.7 million people, including 28.5 million adults
- **Undiagnosed:** 8.5 million people (23.0% of adults are undiagnosed)

Prediabetes

- **Total:** 96 million people aged 18 years or older have prediabetes (38.0% of the adult US population)
- **65 years or older:** 26.4 million people aged 65 years or older (48.8%) have prediabetes



Global diabetes prevalence in 2019 is estimated to be **9.3%.**

Centers for Disease Control and Prevention. National Diabetes Statistics Report website.

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Classification

Group of **metabolic disorders** characterized and identified by the presence of **hyperglycemia in the absence of treatment**.

Type 1	• Beta cell destruction, usually leading to absolute insulin deficiency • Immune mediated: presence of islet cell or insulin antibodies that identify the autoimmune process, leading to beta cell destruction • Idiopathic: no evidence of autoimmunity
Type 2	• Insulin resistance with relative insulin deficiency or insulin secretory defect with insulin resistance
Other specific types	• Genetic defects of beta cell function or insulin action, diseases of exocrine pancreas, endocrinopathies, drug- or chemical-induced diabetes, infections, uncommon forms of immune-mediated diabetes, other genetic syndromes • Impaired fasting glucose (impaired glucose tolerance) • Abnormalities of fasting glucose (abnormal glucose tolerance)
Gestational	• Any degree of abnormal glucose tolerance during pregnancy diabetes

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Symptoms

- Polyphagia
- Polydipsia
- Polyuria
- Fatigue
- Unexplained weight loss
- Impaired wound healing
- Dehydration
- Increased risk of infection

- Hyperviscosity with thrombogenesis
- Nephropathy
- Neuropathy
- Retinopathy
- Dyslipidemia
- Vascular disease
- Diabetic ketoacidosis (type 1)
- Hyperglycemic hyperosmolar syndrome (type 2)

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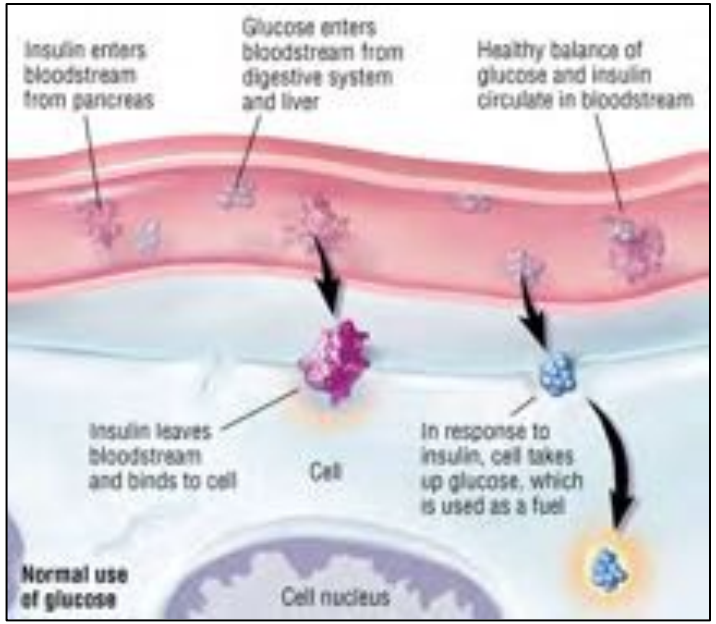
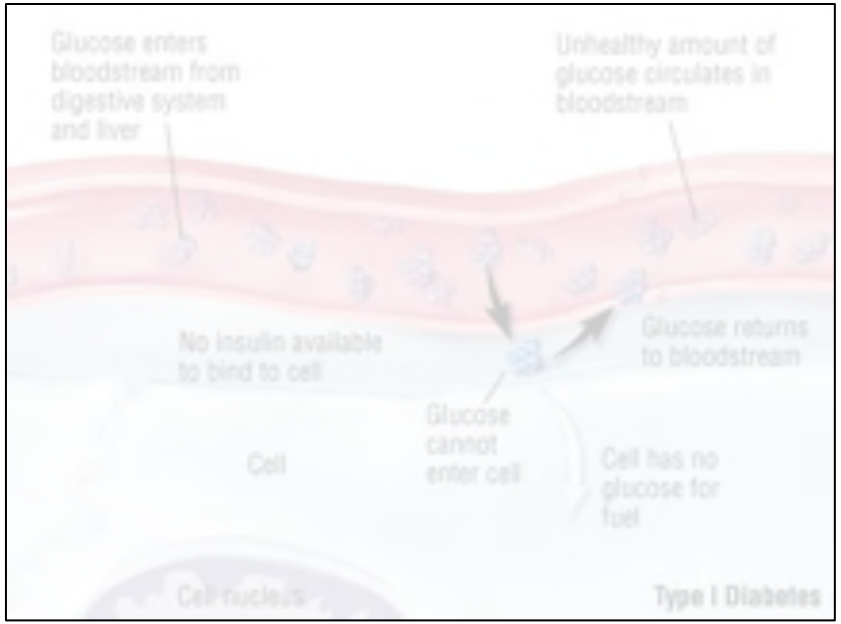
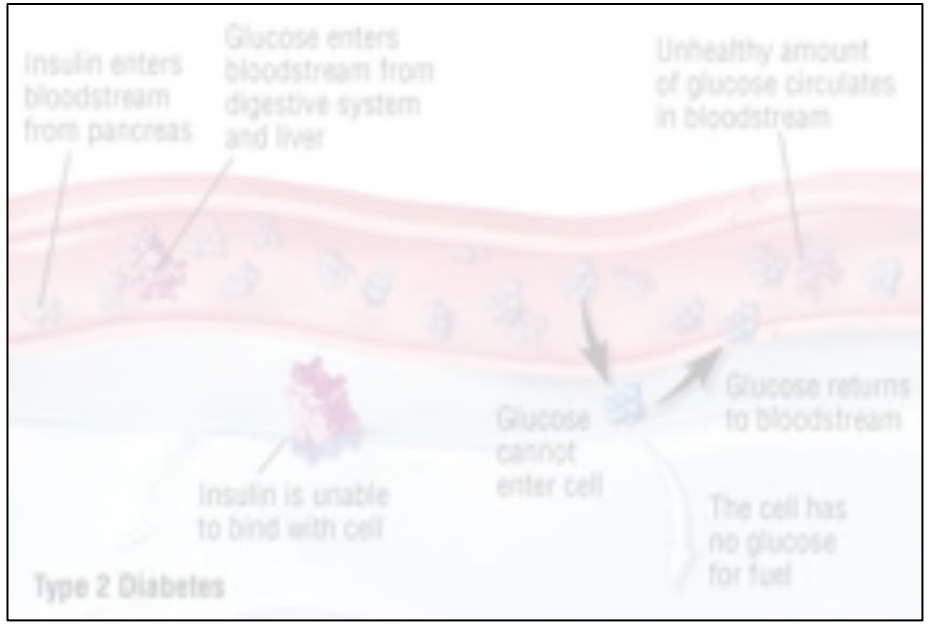
Pathophysiology







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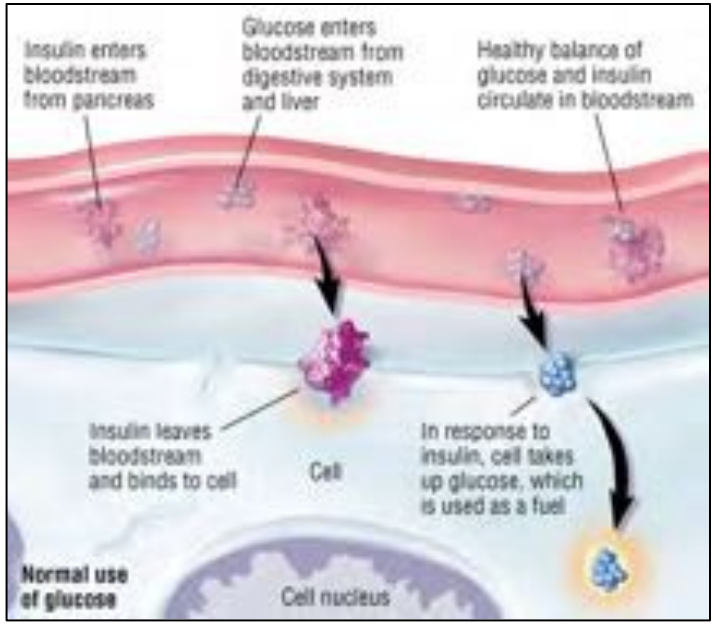
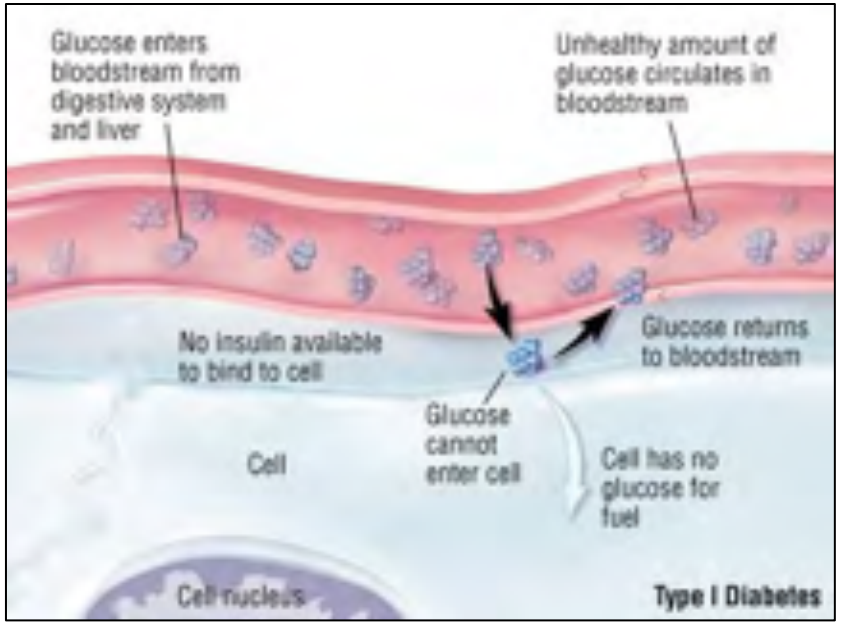
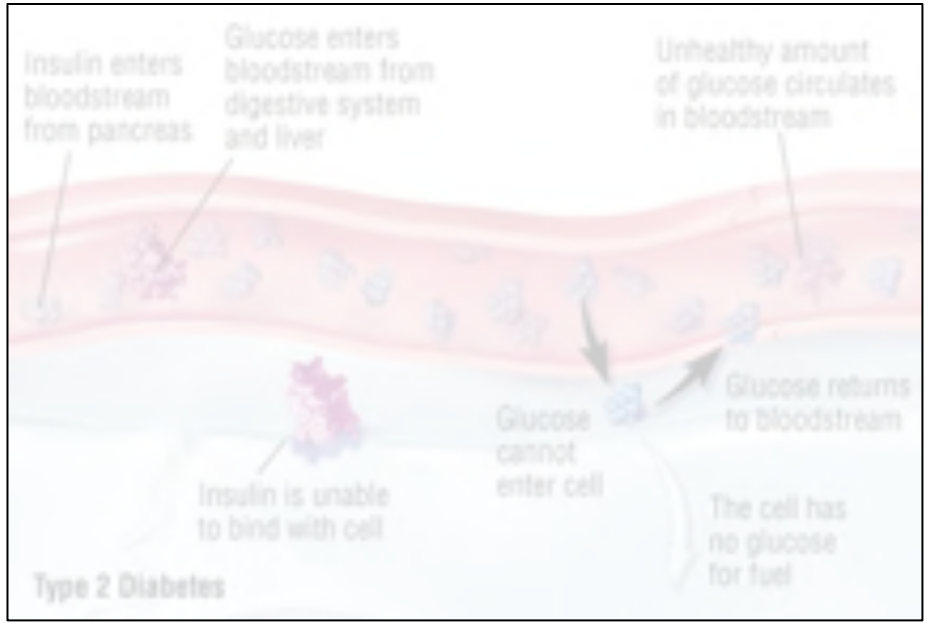
Pathophysiology







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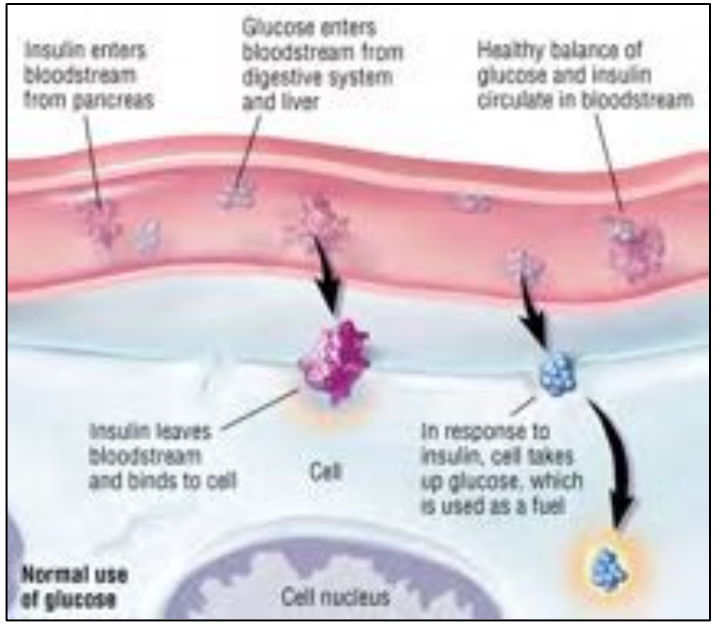
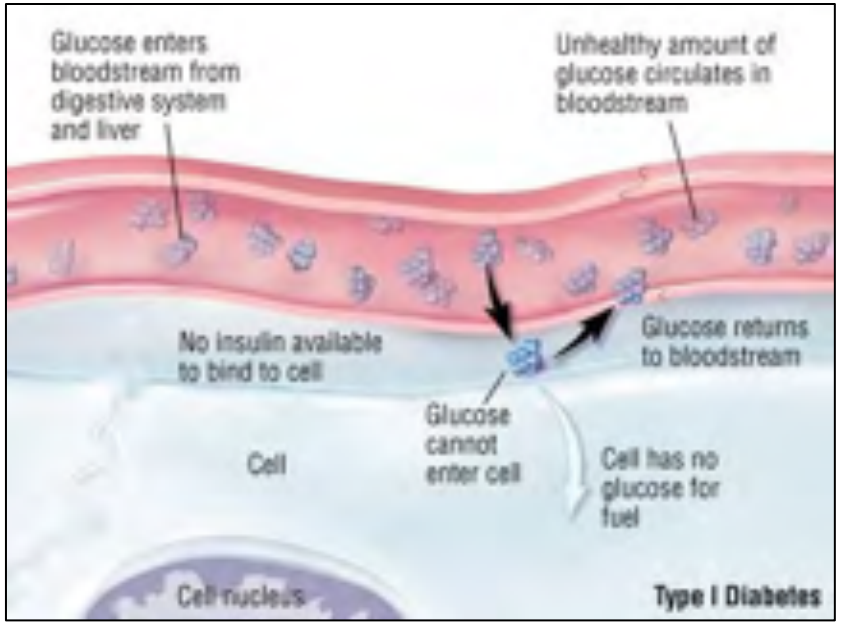
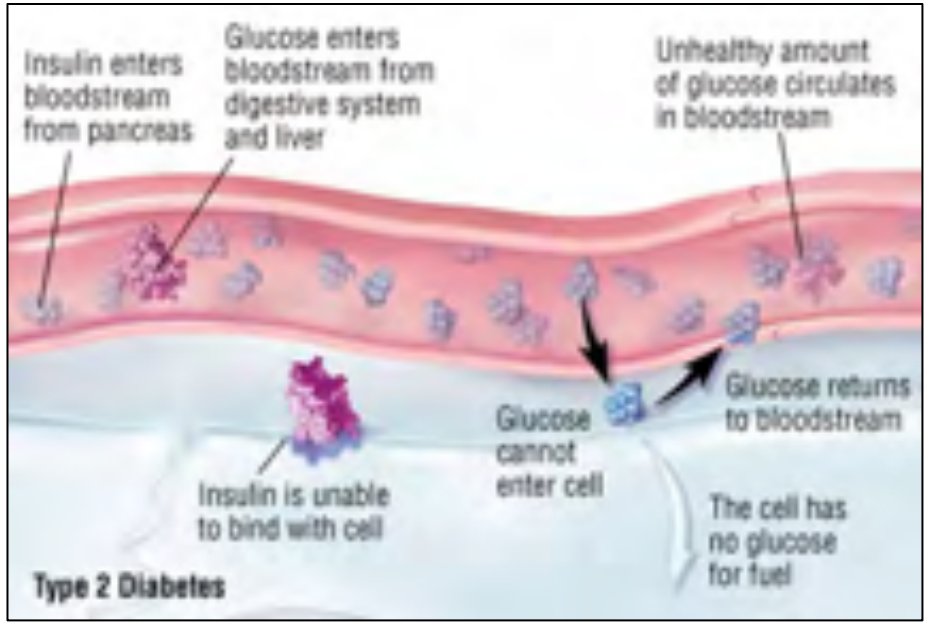
Pathophysiology







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Classification

Stages / Types	Normoglycaemia	Hyperglycaemia		
	Normal glucose tolerance	Impaired glucose regulation IGT and/or IFG	Diabetes Mellitus	
			Not insulin requiring	Insulin requiring for control	Insulin requiring for survival
Type 1 • Autoimmune • Idiopathic	←	—	—	—	→
Type 2* • Predominantly insulin resistance • Predominantly insulin secretory defects	←	—	—	—	⋯→
Other specific types*	←	—	—	—	⋯→
Gestational diabetes*	←	—	—	—	⋯→

Little and Falace's dental management of the medically compromised patient. 2018. 9th Edition. St. Louis, Mo: Mosby.

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Treatment

Table 20-2 Common noninsulin antidiabetic medications*

Drug class	Medication	Mechanism of action	Half-life (h)
Biguanides	• Metformin	Decrease hepatic gluconeogenesis, increase insulin sensitivity	6–18
Sulfonylureas	• Chlorpropamide • Tolbutamide • Glimepiride • Glipizide • Glyburide	Stimulate insulin secretion, decrease insulin resistance	2–10
Meglitinides	• Repaglinide • Nateglinide	Stimulate pancreatic insulin secretion	1
Thiazolidinediones	• Rosiglitazone • Pioglitazone	Regulate carbohydrate and lipid metabolism, reduce insulin resistance and hepatic glucose production	3–8
α-glucosidase inhibitors	• Acarbose • Miglitol	Reduce intestinal absorption of ingested glucose	2–4
Dipeptidyl peptidase-4 inhibitors	• Sitagliptin • Saxagliptin	Reduce breakdown of gastrointestinal hormones (incretins), enhance insulin secretion, decrease glucagon	8–14
Noninsulin injectables	• Exenatide • Pramlintide	Suppress glucagon secretion and hepatic glucose production, suppress appetite, delay gastric emptying	6–10 2–4

Table 20-3 Common insulin medications*

Drug class	Medication	Onset	Duration (h)
Rapid-acting	• Lispro • Aspart • Glulisine	5–15 min	4–6
Short-acting	Regular	30–60 min	6–8
Intermediate-acting	• Neutral protamine hagedorn	2–4 h	4–10
	• Zinc insulin	2–4 h	4–10
	• Extended zinc insulin	6–10 h	10–16
Long-acting (peakless)	• Glargine • Detemir	2–4 h	20–24
Mixed insulins	NPH/regular • Novolin 70/30 • Humulin 70/30 • Humulin 50/50	30–90 min	10–16
	Aspart protamine/Aspart • Novolog mix 70/30	5–15 min	10–16
	Lispro protamine/Lispro • Humalog 75/25 • Humalog 50/50	5–15 min	10–12

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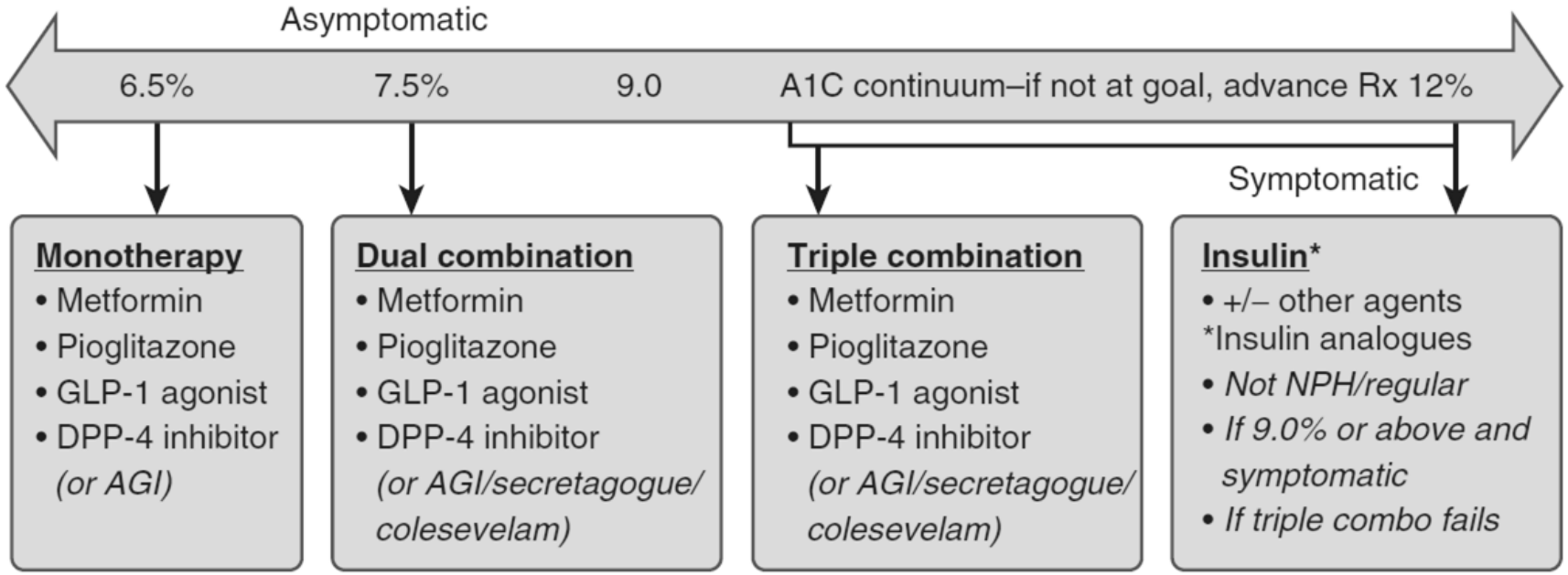
Treatment



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Complications

TABLE 14.1 Expected Years of Additional Life in Persons With and Without Diabetes Compared With Given-Age Cohorts

Attained Age of Diabetic (yr)	Expected Years Additional Life in Patients Without Diabetes	Expected Years Additional Life in Patients With Diabetes	Years Lost Because of Diabetes
10	61.5	44.3	17.2
20	51.9	36.1	13.8
30	42.5	30.1	12.4
40	33.3	23.7	9.6

BOX 14.2 Complications of Diabetes Mellitus

- **Metabolic disturbances:** ketoacidosis and hyperosmolar nonketotic coma (type 2 diabetes)
- **Cardiovascular:** accelerated atherosclerosis (coronary heart disease[1]); two thirds have high blood pressure; risk for stroke and heart disease death is two to four times higher among people with diabetes
- **Eyes:** retinopathy, cataracts; diabetes is leading cause of new cases of blindness among adults
- **Kidney:** diabetic nephropathy; diabetes is leading cause of renal failure
- **Extremities:** ulceration and gangrene of feet; diabetes is leading cause of non–accident-related leg and foot amputations
- **Diabetic neuropathy:** dysphagia, gastric distention, diarrhea, impotence, muscle weakness or cramps, numbness, tingling, deep burning pain
- **Early death:** diabetes is the seventh leading cause of death in the United States, most commonly caused by cardiovascular disease

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Dental Management

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Dental Management

- ✓ Diabetes **undiagnosed** in as many as **50% of all patients.**
- ✓ **Cardinal signs and symptoms of diabetes** (polydipsia, polyuria, polyphagia, weight loss, and weakness).
- ✓ **Findings suggestive of diabetes** (headache, dry mouth, irritability, repeated skin infection, blurred vision, paresthesia, progressive periodontal disease).

REFER TO A PHYSICIAN

Little and Falace's dental management of the medically compromised patient. 2018. 9th Edition. St. Louis, Mo: Mosby.

Dental Management

BOX 14.7 Clinical Detection of Patients With Diabetes

Patient With Known Diabetes

1. Detection by history
   a. Are you diabetic?
   b. What medications are you taking?
   c. Are you being treated by a physician?
2. Establishment of severity of disease and degree of "control"
   a. When were you first diagnosed as diabetic?
   b. What was the level of the last measurement of your blood glucose?
   c. What is the usual level of blood glucose for you?
   d. How are you being treated for your diabetes?
   e. How often do you have insulin reactions?
   f. How much insulin do you take with each injection, and how often do you receive injections?
   g. How often do you test your blood glucose?
   h. When did you last visit your physician?
   i. Do you have any symptoms of diabetes at the present time?

BOX 14.7 Clinical Detection of Patients With Diabetes

Patient With Undiagnosed Diabetes

1. History of signs or symptoms of diabetes or its complications
2. High risk for developing diabetes:
   a. Presence of diabetes in a parent
   b. Giving birth to one or more large babies (>9 lb)
   c. History of spontaneous abortions or stillbirths
   d. Obesity
   e. Age older than 40 years
3. Referral or screening test for diabetes

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Dental Management

Preoperative strategy

Preoperative Assessment

- Type and dose of antidiabetic therapy.
- Blood glucose and/or hemoglobin A_1c level.
- Assess for end-organ damage.
- Hypoglycemia occurrences: frequency, manifestations, blood glucose level at which symptoms occur.
- Hospitalizations related to diabetic complications.
- Assess patient's ability to monitor his or her blood glucose level and manage diabetes.
- Check joint rigidity (prayer test) to assess for limited neck range of motion.
- Schedule morning appointments.
- Remember increased risk of silent ischemia.
- Remember increased risk of aspiration due to gastroparesis.

Management of Meds

- Oral antidiabetic and noninsulin injectable therapy
  - Hold on the day of the surgical procedure until a normal diet is resumed.
- Insulin
  - Day before the surgical procedure
    - No change in basal insulin regimen (unless the patient has a history of hypoglycemia)
  - Day of surgical procedure
    - Insulin pump: no change
    - Long-acting insulin: 75%–100% of morning dose
    - Intermediate-acting insulin and fixed-combination insulin: 50%–75% of morning dose
    - Short-acting and rapid-acting insulin: hold morning dose

Intraop Management

- IV fluids
  - In general, use normal saline and keep the patient well hydrated (hyperglycemia and NPO status causes hypovolemia).
  - If concerned for hypoglycemia, use 5% dextrose solution.
  - Avoid lactated Ringer solution in patients with poorly controlled diabetes (hepatic conversion of lactate to glucose).
- Check blood glucose level every hour.
  - Suggested blood glucose target perioperatively is 80–200 mg/dL.
  - Manage hypo/hyperglycemia accordingly:
    - Hypoglycemia: administer oral glucose and/or IV dextrose and/or IM/IV glucagon.
    - Hyperglycemia: administer subcutaneous rapid-acting insulin analogs.†

Postop Management

- Consider antibiotics for patients with poorly controlled diabetes (increased risk of infection and delayed wound healing).
- Encourage the patient to resume a normal diet as soon as possible.
- Once the patient is on a normal diet, he or she can resume an antidiabetic medication regimen.
- If the patient is unable to resume a normal diet on the day of the surgical procedure, antidiabetic medications should be adjusted under the advisement of the patient's primary care physician.

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Antibiotics?

Dental Management

Antibiotics?

- ✓ Diabetic patient who has the disease under **control** generally **does not require antibiotics** after surgical procedures.
- ✓ **Prophylactic** antibiotics generally are **not required**.
- ✓ **Uncontrolled diabetes = compromised immune system** (neutrophil adherence, chemotaxis, phagocytosis, bactericidal activity, and cell-mediated immunity are compromised).
- ✓ **Antibiotics** indicated in **uncontrolled diabetes** undergoing invasive procedure (SSI more common).
- ✓ **Manage infections aggressively** by incision and drainage, extraction, and antibiotics.

Mizukawa, M. McKenna, S. Vega, L. Anesthesia Considerations for the Oral and Maxillofacial Surgeon. 2017. Quintessence Publishing Co. Inc.

Antibiotics?

Postoperative risk of infection (data for general surgery literature)

FGL below 206 mg/100 mL ---------- **no increased risk.**

FGL between 207 and 229 mg/100 mL ----- **20% increased risk.**

FGL above 230 mg/100 mL ---------- **80% increased risk.**

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Extensive surgery?

Dental Management

Extensive surgery?

- ✓ If patient is **controlled, proceed** with treatment.
- ✓ Consult with patient's physician concerning dietary needs during postoperative period.
- ✓ If **diabetes is not well controlled** (i.e., FBG <70 mg/dL or >200 mg/dL and comorbidities [post-MI, renal disease, CHF, symptomatic angina, old age, arrythmias, stroke] are present and blood pressure >180/110 mm Hg or <4 METS):
  - Provide appropriate **emergency care only**.
  - Refer for **medical evaluation**, management, and risk factor modification.
- ✓ If patient is **symptomatic**, seek **IMMEDIATE referral**.
- ✓ If patient is **asymptomatic**, request **routine referral**.

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Dental extractions?

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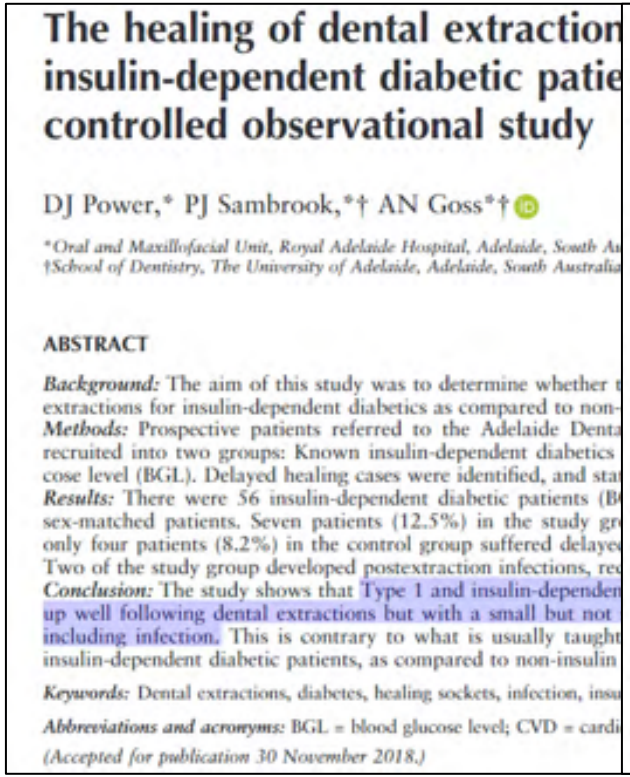
Dental Management

Dental extractions?



The healing of dental extraction
insulin-dependent diabetic patie
controlled observational study

DJ Power,* PJ Sambrook,*† AN Goss*†

*Oral and Maxillofacial Unit, Royal Adelaide Hospital, Adelaide, South Au
†School of Dentistry, The University of Adelaide, Adelaide, South Australia

ABSTRACT

Background: The aim of this study was to determine whether t
extractions for insulin-dependent diabetics as compared to non-
Methods: Prospective patients referred to the Adelaide Denta
recruited into two groups: Known insulin-dependent diabetics
cose level (BGL). Delayed healing cases were identified, and sta
Results: There were 56 insulin-dependent diabetic patients (B
sex-matched patients. Seven patients (12.5%) in the study gr
only four patients (8.2%) in the control group suffered delaye
Two of the study group developed postextraction infections, re
Conclusion: The study shows that Type 1 and insulin-dependen
up well following dental extractions but with a small but not
including infection. This is contrary to what is usually taught
insulin-dependent diabetic patients, as compared to non-insulin

Keywords: Dental extractions, diabetes, healing sockets, infection, insu

Abbreviations and acronyms: BGL = blood glucose level; CVD = cardi

(Accepted for publication 30 November 2018.)

The healing of dental extraction sockets i
Type 2 diabetes on oral hypoglycaemics:
cohort

S Huang,* H Dang,* W Huynh,* PJ Sambrook,*† AN Goss*†

*Oral and Maxillofacial Unit, Royal Adelaide Hospital, South Australia.
†School of Dentistry, The University of Adelaide, South Australia.

ABSTRACT

Background: The aim of this study was to determine whether there is a differen
extractions for Type 2 diabetics on oral hypoglycaemics and non-diabetic patients.
Methods: Prospective patients referred for dental extractions were recruited into t
diabetics with no conditions associated with poor healing. All had a random blood
performed using local anaesthesia. Delayed healing cases were identified and statis
risk factors.
Results: There were 224 Type 2 diabetics on oral hypoglycaemics (BGL 7.51, ra
The diabetic group were older, more males and less smokers than the control grou
betic and 16 (7%) control group, had socket healing delayed for more than one we
were no statistical differences between delayed healing and age, gender, diabetic
control group had more healing problems.
Conclusions: The traditional view that diabetics have increased delayed healing w
oral hypoglycaemics should be treated the same as non-diabetic patients for extract

Keywords: Diabetes, Type 2, blood glucose levels, extractions, delayed healing, prospective

Abbreviations and acronyms: BGL = blood glucose level; IFG = impaired fasting glucose;
oral and maxillofacial surgery.

(Accepted for publication 16 July 2012.)

ORIGINAL RESEARCH

Comparison of Extraction Socket Healing in Non-Diabetic, Prediabetic, and Type 2 Diabetic Patients

This article was published in the following Dove Press journal:
Clinical, Cosmetic and Investigational Dentistry

Srikanth Gadicherla[1]
Komal Smriti[2]
Sreea Roy[1]
Kalyana-Chakravarthy Pentapati[3]
Jyotsna Rajan[1]
Apoorva Walia[1]

[1]Department of Oral and Maxillofacial Surgery, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India; [2]Department of Oral Medicine and Radiology, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India; [3]Department of Public Health Dentistry, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India

Objective: To compare the healing of extraction socket among non-diabetic, prediabetic, and diabetic patients.
Materials and Methods: A single-center prospective observational study was conducted. Glycated hemoglobin and random blood glucose were recorded for all the participants before the procedure. A trained and calibrated examiner evaluated the socket size on postoperative days 0 and 7. Postoperative pain (PoP), discharge, swelling, infection, erythema, dry socket, and the number of analgesics were also recorded.
Results: A total of 100 participants completed this study with a mean age of 54.7±12.11. There was no significant difference in the mean socket size among the three study groups on day 0 (P=0.101). However, there was a significant difference in the mean socket size on day 7 among the three groups. A post hoc test showed that the diabetic group had a larger socket size than the non-diabetic group (P=0.011). Complications like swelling and infection were more in the diabetic group. There was no significant difference in the mean number of analgesics among the three groups (P=0.169). The adjusted means for the socket size on postoperative day 7 was significantly higher for diabetic than the non-diabetic group.
Conclusion: The socket dimension was larger on postoperative day 7 in people with diabetes which suggested delayed healing without persistent complications. Dental extractions can be performed safely in optimally controlled diabetic patients with minimal complications.

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Dental implants?

Dental Management

Dental Implants?

Hyperglycemia

- ✓ Reduces bone formation.
- ✓ Inhibits osteoblastic differentiation.
- ✓ Alters response of the parathyroid hormone in metabolism of Ca and P.
- ✓ Affects adherence, growth and accumulation of extra-cellular matrix.
- ✓ **Bone loss up to 40%** (directly related to poor control of diabetes).

HbAc1 (%)	mg/dl	mmol/l
6	135	7,5
7	170	9,5
8	205	11,5
9	240	13,5
10	275	15,5
11	310	17,5
12	345	19,5

Insulin directly stimulates the formation of osteoblastic matrix

Mellado-Valero A, Ferrer García JC, Herrera Ballester A, Labaig Rueda C. Effects of diabetes on the osseointegration of dental implants. Med Oral Patol Oral Cir Bucal. 2007 Jan 1;12(1):E38-43.

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Dental Implants?

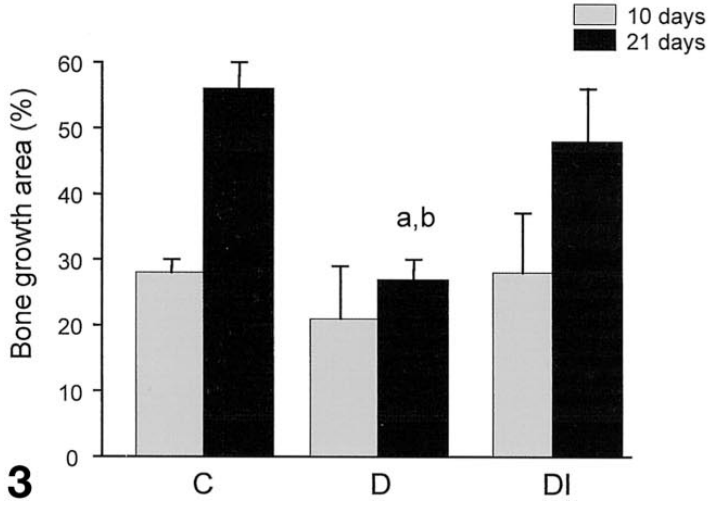
- ✓ **Insulin stimulates bone formation**.
- ✓ **Bone–implant interface** observed in diabetics under the influence of **insulin** resembled a **normal osseointegration process**.

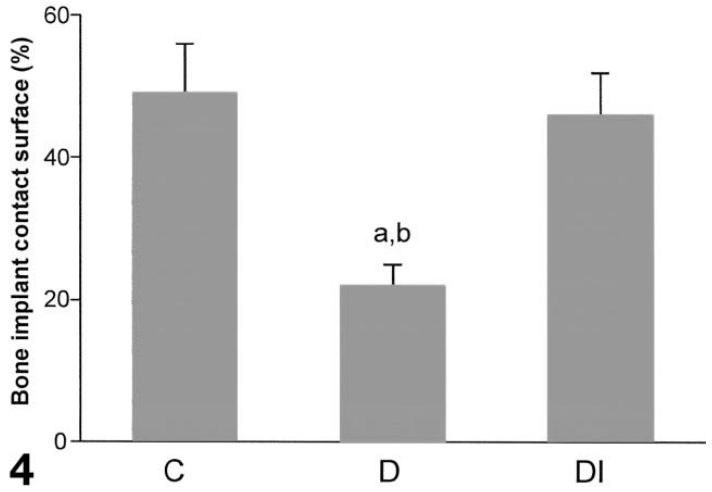
CONTROL OF THE METABOLIC STATUS OF THE DIABETIC PATIENT IS ESSENTIAL FOR SUCCESSFUL OSSEOINTEGRATION.

ID

Bone Formation Around Titanium Implants in the Rat Tibia: Role of Insulin

José T. Siqueira, DDS, PhD,* Simone C. Cavalher-Machado, MSc,** Victor E. Arana-Chavez, DDS, PhD,*** and Paulina Sannomiya, PhD**





Siqueira JT, Cavalher-Machado SC, Arana-Chavez VE, Sannomiya P. Bone formation around titanium implants in the rat tibia: role of insulin. Implant Dent. 2003;12(3):242-51.

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Naujokat et al. International Journal of Implant Dentistry (2016) 2:5
DOI 10.1186/s40729-016-0038-2

International Journal of Implant Dentistry
a SpringerOpen Journal

REVIEW Open Access

Dental implants and diabetes mellitus—a systematic review

Hendrik Naujokat*, Burkhard Kunzendorf and Jörg Wiltfang

- ✓ Poorly controlled diabetes leads to **impaired osseointegration**, elevated risk of **peri-implantitis**, and **higher level of implant failure.**
- ✓ The supportive administration of **antibiotics and chlorhexidine** seems to **improve implant success**.
- ✓ Controlled diabetes, implant procedures are safe and predictable with a similar complication rate.

International Journal of Oral & Maxillofacial Surgery

Systematic Review Paper
Dental Implants

The impact of diabetes on dental implant failure: a systematic review and meta-analysis

V. Moraschini, E. S. P.Barboza, G. A. Peixoto
Department of Periodontology, School of Dentistry, Fluminense Federal University, Rio de Janeiro, Brazil

Int. J. Oral Maxillofac. Surg. 2016; 45: 1237–1245
http://dx.doi.org/10.1016/j.ijom.2016.05.019, available online at http://www.sciencedirect.com

- ✓ Number of **implant failures does not differ** between diabetic and non-diabetic subjects.
- ✓ Comparison between type 1 and 2 diabetes subjects showed **no difference** in the number of failures
- ✓ **Marginal bone loss** had a statistically significant difference **favoring non-diabetic subjects**.

Dental Implants?

Implant Survival		
Uncontrolled diabetes	Controlled diabetes	Healthy patients
86%-91%	96.5%	93%-98%

Mellado-Valero A, Ferrer García JC, Herrera Ballester A, Labaig Rueda C. Effects of diabetes on the osseointegration of dental implants. Med Oral Patol Oral Cir Bucal. 2007 Jan 1;12(1):E38-43.

Dental Management

Dental Implants?

- ✓ **Eradication of co-morbidities** (poor oral hygiene, cigarette-smoking, periodontitis).
- ✓ Stabilization of glycemic control (**HbA1c 7%**).
- ✓ Preventative measures against infection:
  - **Chlorhexidine rinse** reduced the failure rate in type 2 diabetes patients from **13.5% to 4.4%.**
  - **Preoperative antibiotics** decreased the failure rate in the same population from **13.4% to 2.9%.**
- ✓ **Adequate follow up**.

Marchand F, Raskin A, Dionnes-Hornes A, Barry T, Dubois N, Valéro R, Vialettes B. Dental implants and diabetes: conditions for success. Diabetes Metab. 2012 Feb;38(1):14-9.

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Complications

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Hypoglycemia (conscious)

- ✓ Administration of **glucose** should be performed **promptly** when hypoglycemia is suspected.
- ✓ **Should no delay** the administration of a glucose agent to obtain BG.
- ✓ The **risk of acute hypoglycemia is greater** than that of acute hyperglycemia.

BOX 20-5 Management of hypoglycemia: Conscious patient

1. Recognize problem (altered consciousness).
2. Discontinue treatment.
3. Position the patient comfortably.
4. Check ABCs; assess and perform basic life support as needed.
5. Administer O_2.
6. Monitor vital signs every 5 minutes.
7. Measure blood glucose level if equipment is available.
8. Administer oral glucose (eg, glucose tablets/gel, juice, soda).
9. Reassess clinical symptoms and blood glucose level.

If patient responds appropriately:

- Encourage consumption of complex carbohydrate with protein.
- Discharge patient when he or she has recovered.

If patient does not respond to oral glucose:

- Administer IM/IV glucagon or IV dextrose

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Hypoglycemia (unconscious)

- ✓ Administration of **glucose** should be performed **promptly** when hypoglycemia is suspected.
- ✓ **Should no delay** the administration of a glucose agent to obtain BG.
- ✓ The **risk of acute hypoglycemia is greater** than that of acute hyperglycemia.

BOX 20-6 Management of hypoglycemia: Unconscious patient*

1. Recognize the problem (unresponsive).
2. Discontinue treatment.
3. Position the patient in the supine position.
4. Check ABCs; assess and perform basic life support as needed.
5. Administer O_2.
6. Monitor vital signs every 5 minutes.
7. Measure blood glucose level if equipment is available.
8. Administer carbohydrates:
   - IM/IV glucagon: 0.025–0.1mg/kg up to 1 mg
   - IV 50% dextrose solution: 1 mL/kg up to 50 mL
   - IV D5W: 10 mL/kg up to 500 mL
   - Transmucosal glucose syrup or rectal honey or syrup
9. Reassess clinical symptoms and blood glucose level.

If patient responds appropriately:

- Encourage consumption of a complex carbohydrate with protein.
- Discharge the patient when he or she has recovered or consider transfer to emergency department.

Activate EMS if consciousness is not restored.

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Hyperglycemia (DKA)

- ✓ Marked hyperglycemia is **associated** with **diabetic ketoacidosis** (DKA).
- ✓ It is considered a **MEDICAL EMERGENCY**.
- ✓ Symptoms such as nausea, vomiting, polydipsia, polyuria, abdominal pain, **Kussmaul respirations** (deep, gasping, labored), altered level of consciousness, and possible coma.
- ✓ Patients in DKA will be acidotic, dehydrated, hyperglycemic, and have ketones in their blood and urine.
- ✓ Treatment requires **hospitalization** and includes: IV fluids, insulin, management of any underlying causes (ie, infection), and close observation.

Mizukawa, M. McKenna, S. Vega, L. Anesthesia Considerations for the Oral and Maxillofacial Surgeon. 2017. Quintessence Publishing Co. Inc.

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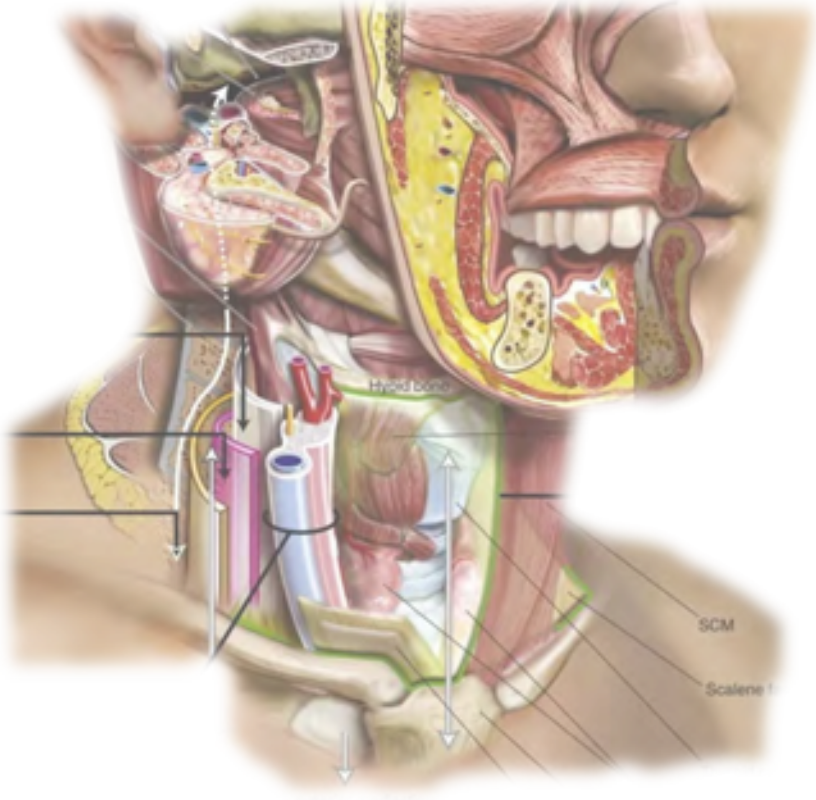
Infections



Dynamic Process

Host Factors
- Local
- Humoral
- Cellular

Microbial Factors
- Amount
- Virulence

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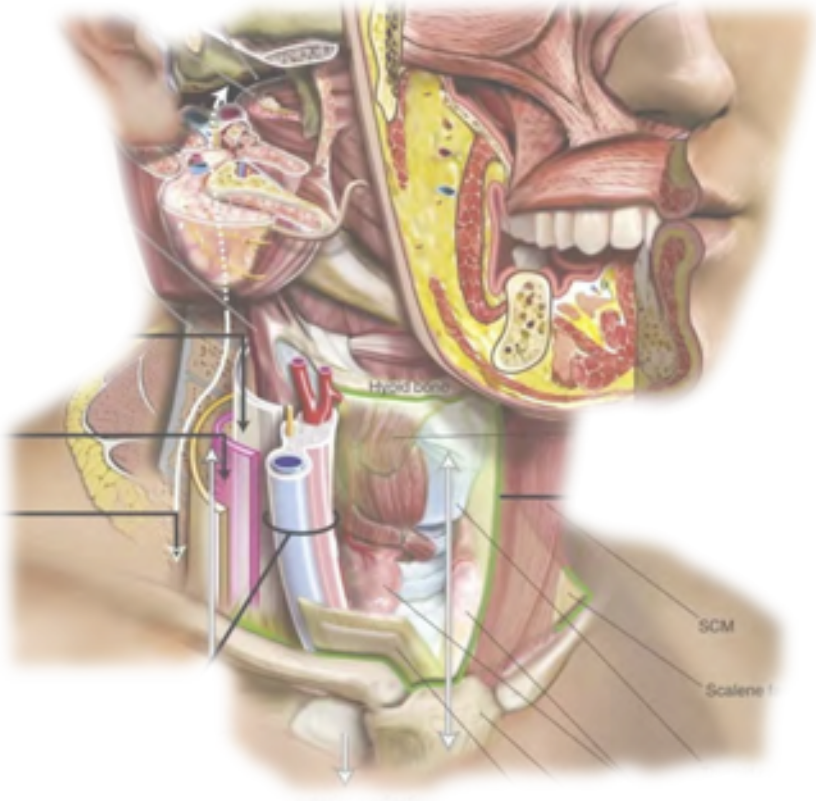
Infections

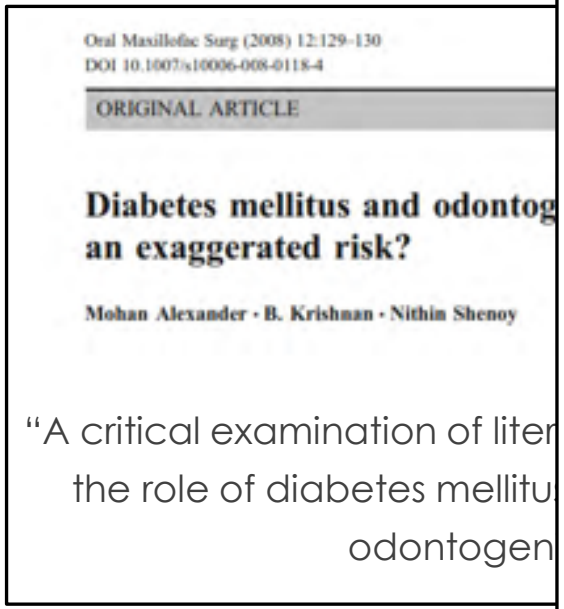


Dynamic Process

Host Factors
- Local
- Humoral
- Cellular

Microbial Factors
- Amount
- Virulence

Infections


Oral Maxillofac Surg (2008) 12:129–130
DOI 10.1007/s10006-008-0118-4

ORIGINAL ARTICLE

Diabetes mellitus and odontog
an exaggerated risk?

Mohan Alexander · B. Krishnan · Nithin Shenoy

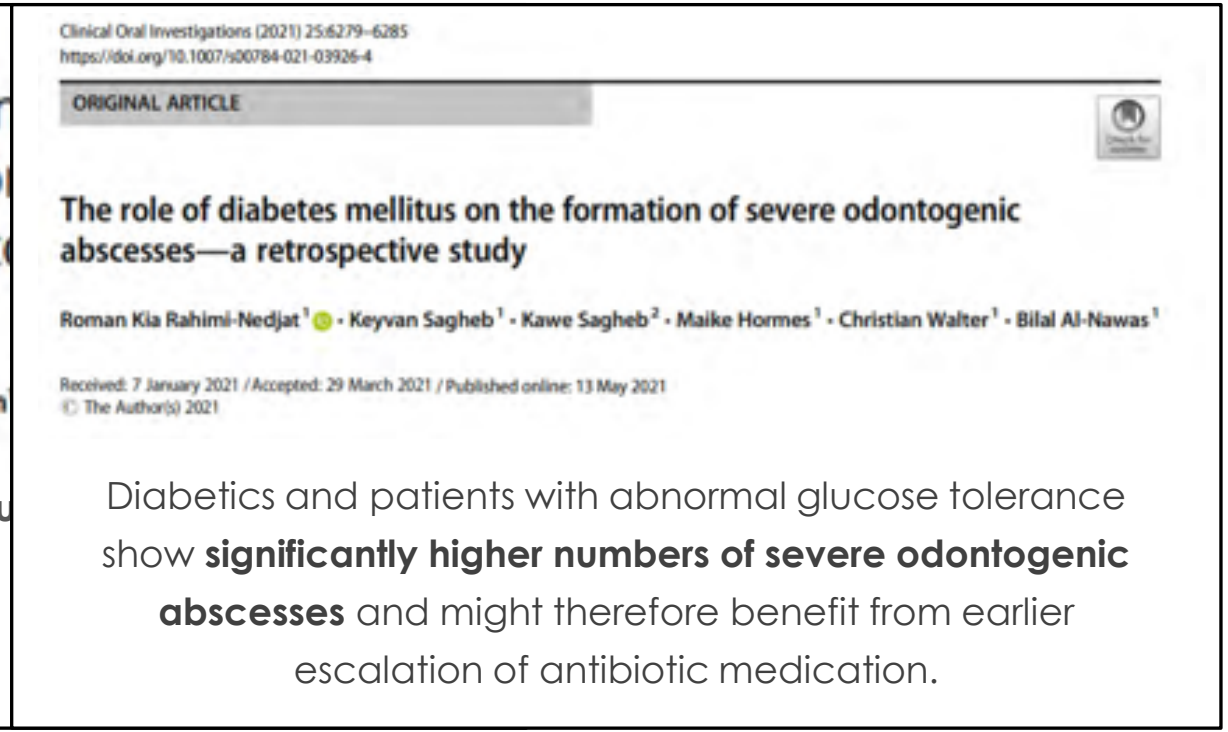
"A critical examination of liter
the role of diabetes mellitu
odontogen


RESEARCH ARTICLE

Examining the correlation
and odontogenic infectio
retrospective, matched-c
Taiwan

Hui-Hsin Ko[1,2,3], Wu-Chien Chien[4], Yen-Hung Lin
Jung Cheng[1,6,7]*

- ✓ **Correlation** between **facial cellu**
  was confirmed.
- ✓ Risk of occurrence **1.409 times**
  control group.


Clinical Oral Investigations (2021) 25:6279–6285
https://doi.org/10.1007/s00784-021-03926-4

ORIGINAL ARTICLE

The role of diabetes mellitus on the formation of severe odontogenic abscesses—a retrospective study

Roman Kia Rahimi-Nedjat[1] · Keyvan Sagheb[1] · Kawe Sagheb[2] · Maike Hormes[1] · Christian Walter[1] · Bilal Al-Nawas[1]

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Diabetics and patients with abnormal glucose tolerance show **significantly higher numbers of severe odontogenic abscesses** and might therefore benefit from earlier escalation of antibiotic medication.

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Infections

- ✓ 64 y/o male.
- ✓ Uncontrolled diabetes.
- ✓ Recent dental extractions by general dentist.
- ✓ Treated with Abx with no improvement.
- ✓ Transferred to UH for management of facial abscess.
- ✓ MIO 10 mm.

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Infections

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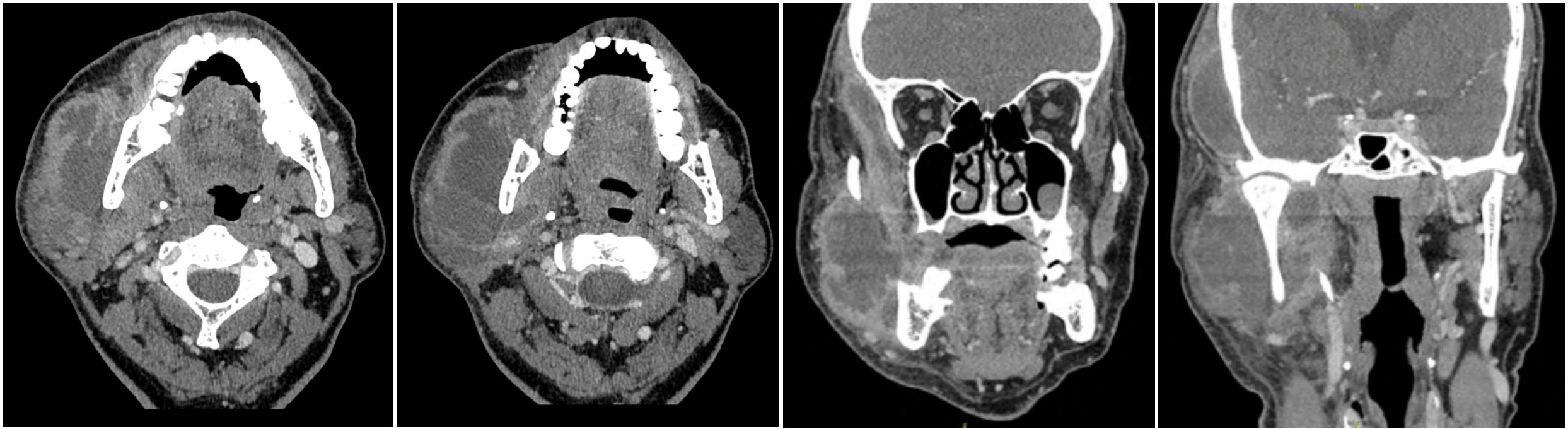
Infections



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Infections

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Infections

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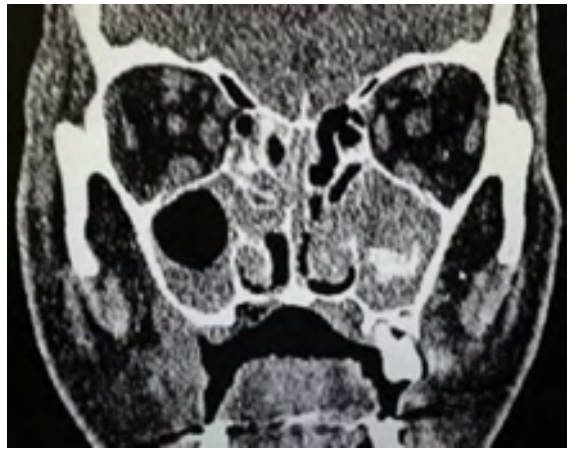
Mucormycosis

- ✓ Mucormycosis is a **rare** opportunistic fungal infection.
- ✓ Overall **mortality is about 40%**, despite surgical debridement and intensive antifungal treatment.
- ✓ Occurs most often in **diabetic and immunocompromised patients**.
- ✓ Prevalence in the US varies between **0.01 and 0.2 per 100,000 population.**
- ✓ **Dental extractions** may create a portal of entry for the fungal infection.
- ✓ **31 cases** associated with dental extractions reported in the literature.



Emodi O, Ohayon C, Bilder A, Capucha T, Wolff A, Rachmiel A. Postextraction Mucormycosis in Immunocompromised-Patient Management and Review of Literature. J Oral Maxillofac Surg. 2021 Jul;79(7):1482.

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Take Home Points

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Take Home Points

- ✓ Diabetes **undiagnosed** in as many as **50% of all patients.**
- ✓ Refer the patient to a physician when findings suggestive of diabetes (**help with diagnosis**).
- ✓ Establish the **severity of the disease and degree of control** (type, medications, last HbA1c, hospitalizations).
- ✓ If IV sed or GA (patient in NPO), **hold antidiabetic medications appropriately** (consider type and half life), control and manage blood sugar levels.
- ✓ Consider **antibiotic for uncontrolled diabetes** and invasive procedures.

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Take Home Points

- ✓ Proceed with **extractions if diabetes is controlled**. If **uncontrolled, provide emergency care only** (informed consent).
- ✓ Implants are not contraindicated, however, **control of the metabolic status** of the diabetic patient is **essential for successful osseointegration**.
- ✓ Consider **Antibiotic and Chlorhexidine** to decrease dental implant failure rate (13.4% to 2.9%).
- ✓ **Recognize and treat complications** associated with diabetes and **REFER PROMPTLY** if necessary.

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Take Home Points

1. Patients
2. Clinical exam
3. Diagnosis
4. Risk assessment
5. Treatment

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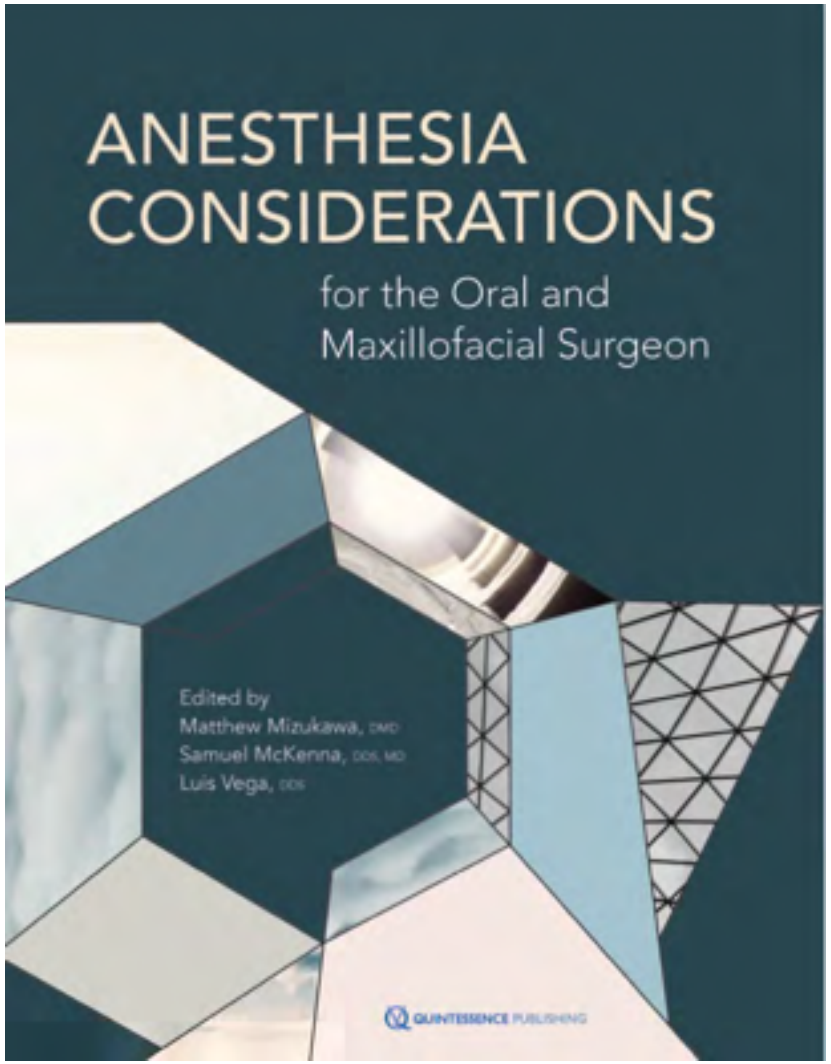

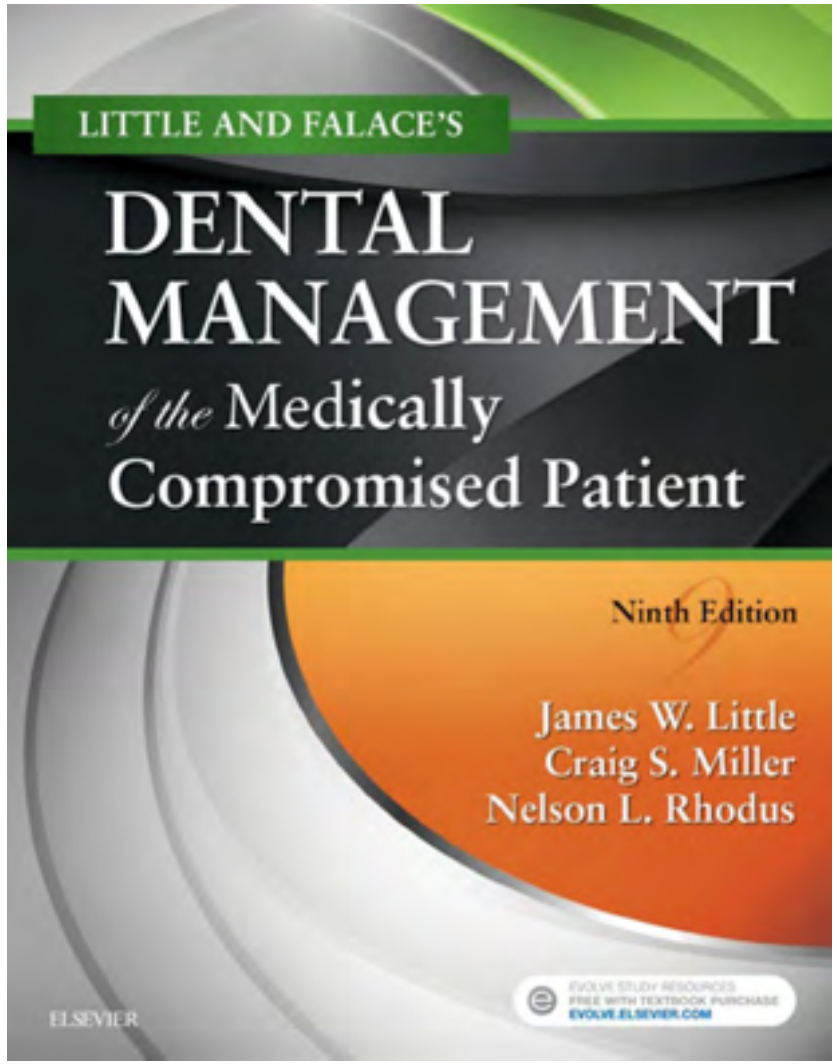

UT Health San Antonio

Cayo de Agua, Los Roques, Venezuela

amaristaroja@uthscsa.edu