

Case Report

Bariatric Surgery and Implications for Oral Health: A Case Report

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Introduction

Because of high rates of obesity, and the resultant 5 fold increase in bariatric surgery, it is likely the number of dental patients presenting with a history of bariatric surgery is also rising.¹⁻⁴ Heling et al found that 34% of patients reported an increase in frequency of dental visits following bariatric surgery, which further increases the likelihood more of these patients will be seen in the dental office.⁵ This case report is representative of people undergoing bariatric surgery to reduce morbid obesity and manage chronic medical conditions.¹ Both before and after surgery, there are implications for dental care requiring careful follow-up. This report provides dental professionals with an overview of dental considerations to enhance their ability to provide bariatric patients with high quality preventive care and non-surgical periodontal therapy (NSPT), as prescribed.

Review of the Literature

Bariatric surgery is not cosmetic surgery. Rather, it is medically necessary for many morbidly obese people to aid in loss of large amounts of weight to assist with risk reduction and management of chronic diseases that increase the risk of morbidity and mortality.⁶ The implications of bariatric surgery, cardiovascular disease and diabetes for dental care will be briefly reviewed before sharing the details pertaining to the patient in this case report.

Obesity

In the past 25 years, obesity in adults has doubled. The 2005 to 2006 National Health and Nutrition Examination Survey estimated that 34% of adults in the United States are obese as defined by a Body Mass Index (BMI) greater than 30 kg/m², and 32.7% are overweight (BMI of 25 to 29.9 kg/m²), with 1.6 billion adults being affected world-

Abstract

Purpose: A case representative of issues dental practitioners may face when providing care to patients with a history of bariatric surgery is reviewed. Meta-analysis shows that, following bariatric surgery, 43 to 79% of diabetes, hyperlipidemia and hypertension in patients resolved to normal levels or no longer required therapy. However, bariatric surgery side effects have implications for oral health, including nutrient deficiencies impacting healing of oral tissues and gastroesophageal reflux, resulting in tooth erosion. Patients who have undergone bariatric surgery are seen with increasing frequency in dental offices and dental professionals need to be familiar with the challenges these patients present.

Key words: Bariatric, Disease, Oral Health, Periodontal Surgery

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wide.²⁻⁴ Seventy-two million Americans and 400 million adults worldwide are obese (BMI>30 kg/m²).³ Obesity is a systemic disease substantially raising the risk for co-morbidities and complications affecting overall health from chronic diseases such as hypertension, type 2 diabetes, coronary heart disease and stroke.^{7,8} In addition to the link between obesity and chronic diseases, epidemiologic studies suggest an association between obesity and periodontal disease.⁹⁻¹⁶ The link between periodontal disease and obesity, along with other chronic disease, such as cardiovascular disease, is proposed to be the biologic mediators of the inflammatory process.^{12,17-20}

A meta-analysis supports bariatric surgery as an effective means of long term weight loss, therefore increasing the number of patients who undergo procedures such as gastric bypass and gastric lap band surgery.⁶ As more patients present in the dental office with a history of bariatric surgery, it becomes crucial that dental professionals be familiar with these types of surgery and the potential impact on dental care.

Bariatric Surgery

The impact of bariatric surgery on weight loss

and chronic disease in a recent meta-analysis found diabetes resolved in 60% of cases, hyperlipidemia (high cholesterol and/or triglycerides) improved in 70% of patients and 43% had resolution of hypertension.⁶ In the meta-analysis, resolution refers to the disappearance of the co-morbid condition or the condition no longer required therapy.¹ In addition to improvements in chronic disease, weight loss was significant and sustainable long term.^{21,22}

The 2 categories of bariatric surgery include malabsorptive and restrictive. The most common bariatric surgeries are adjustable gastric bands (AGB) and Roux-en-Y gastric bypass (RYGP, Figure 1).²³ In malabsorptive-type surgeries such as RYGP, portions of the stomach and small intestine are bypassed, which leads to restriction of food intake along with reduction in the absorption capacity of the intestine. In restrictive-type surgeries, such as AGB, the mechanism of action is primarily a restriction in the amount of food consumed using a bracelet-like band that is placed around the upper part of the stomach and can be adjusted by adding or decreasing the amount of saline solution in the band or balloon.²⁴

Following bariatric surgery, the stomach holds approximately 1 to 2 ounces, which requires the patient to eat frequent, small meals with the intake of fluids spread throughout the day. This frequency of meals puts the patient at increased risk for dental caries. However, the level of risk is dependent upon types of foods selected and other caries risk factors.²⁵ Bariatric surgery patients are encouraged to choose nutrient-dense foods, which reduces cariogenicity of the diet and minimize intake of empty calories, such as high fat and high-sugar type foods.²⁶ Another reason for increased caries risk and tooth erosion is the high prevalence of gastroesophageal reflux (GER) in the morbidly obese (73%) that is not entirely resolved following bariatric surgery.²⁷ GER may improve after RYGP, but it may worsen after AGB, with one-third of patients developing severe reflux.²⁷ In addition to issues with GER, bariatric surgery patients may also experience frequent vomiting.⁵

Another common problem experienced after bariatric surgery are nutritional deficiencies which have the potential to impact healing following dental treatment. Malnutrition and micronutrient deficiencies tend to be more common after malabsorptive surgical procedures because of loss of intestinal surface for nutrient absorption, but it can occur in restrictive procedures as well.²⁴ A review of nutrition complications following malabsorptive-type bariatric surgery found the following

incidence of nutrition issues: protein inadequacy (13 to 18%), vitamin A deficiency (12 to 69%), vitamin B12 deficiency (33%), iron deficiency (13 to 47%) and zinc deficiency (36 to 50%).^{24,28} One concern for oral health professionals is the risk for calcium and vitamin D metabolic defects leading to issues with bone density following RYGP. Other studies found vitamin D depletion rose significantly beyond existing deficiencies

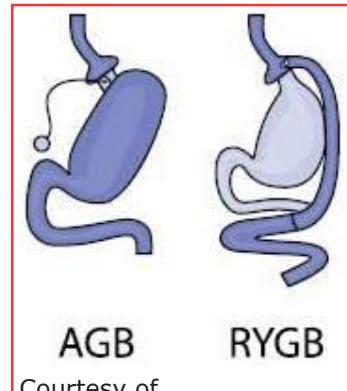
from 57% to 63% in a 4 year span.²⁴ Research is needed to evaluate the long term impact on periodontal health. In restrictive-type surgery, nutrient deficiencies are less common because patients retain function of the entire gastrointestinal tract.²⁸ Therefore, the primary reason for deficiency in restrictive-type surgery is poor food selection.

An additional concern for patients who undergo bariatric surgery is the risk of gastric cancer. According to an article by Collins et al, historical cohorts demonstrate an increased incidence of gastric cancer in patients with gastric and duodenal ulcers after bariatric surgery.²⁹ This is due to inflammation, ulceration and hyperproliferative changes to the squamous epithelium of the esophagus caused by chronic reflux post surgery.²⁹ However, incidence is thought to be less in patients with the RYGP due to the anatomical differences between this surgical procedure and other gastric operations, such as distal gastrectomy.³⁰ Although the risk of developing gastric or esophageal cancer is a concern, overall bariatric surgery has shown an inverse association (reduction) for cancer incidence and mortality for all cancers.^{31,32}

Diabetes

Diabetes is a chronic disease in which the body does not produce or properly use insulin, and type 2 (the most common form) specifically results from insulin resistance. Diabetes requires significant self care by the patient to maintain glycemic control and reduce the incidence of complications.³³ Research about the relationship between poorly controlled diabetes and severity of periodontal disease and tooth loss suggests a correlation.^{18,34-36} Since poorly controlled diabetes increases the risk for more severe periodontitis, periodontal therapy

Figure 1: Diagram of common bariatric surgeries.



Courtesy of
Dr. Walter Pories, MD

Table I: Sample Questions to Ask the Patient's Medical Provider and Implications for Dental Care

	Rationale	Question	Answer
INR	Patient reports anticoagulant use and bleeding is anticipated with non-surgical periodontal therapy. To ensure patient safety, a consultation is needed to determine the patient's INR and whether modification of current anticoagulant regimen is necessary.	What was the date of the most recent INR and the result? Do you recommend the patient reduce dosage or stop use for several days prior to dental appointments when bleeding is anticipated?	Therapeutic range for the INR is between 2.5 + 0.5. Hemorrhage should not be an issue if the patient's INR is >3.0. In certain procedures where significant bleeding may occur, modification of the warfarin regimen may be necessary.
Hemoglobin A1c	Patient reports a history of diabetes and is at increased risk for prolonged healing time. There is a strong correlation between diabetes and periodontal disease and the inflammatory process in periodontal disease may negatively impact glycemic control.	What was the patient's last HbA1c level and the date of test? Has the patient been compliant with self-management of their diabetes? Do you the patient's diabetes controlled?	Goal: <7%. Patients with a goal of <6% may be at higher risk for hypoglycemic events.
Fasting Blood Glucose (FBG)	Need to know history of FBG as this is needed in addition to the HbA1C to access glycemic control. The recommended medication regime helps the dental practitioner determine patient compliance.	What is the patient's fasting blood glucose level? What type of oral medication and/or insulin regimen and usual dosage is the patient currently taking?	Glucose levels between 90 and 130 mg/dl and below 180 mg/dl 2 hours postmeal although these numbers may be higher for those at high risk for hypoglycemia.
Hypoglycemia	History of hypoglycemia is a predictor of future episodes so this information is essential to anticipate and prevent a medical emergency.	Have you had problems with hypoglycemia? What time of day does this usually occur? Have you had hypoglycemia during dental treatment? Have you been hospitalized for hypoglycemia?	If the patient reports history of hypoglycemia, ensure they ate a snack or meal with protein and/or fat prior to appointment. Check blood glucose with a glucometer to ensure it is safe to proceed with treatment.

must be part of the comprehensive care of the patient with diabetes.^{18,35}

Despite the connection between uncontrolled diabetes and severity of periodontal disease, inconsistent research findings make it less clear that controlling periodontal disease improves metabolic control of a patient's diabetes.^{34,37-43} Regardless of inconsistent research findings, medical and dental practitioners need to encourage patients to manage their periodontal health since it may be one of the factors involved in glycemic control.³⁶ In addition, dental professionals need to be concerned with the patient's glycemic control prior to beginning dental treatment to maximize healing and to prevent medical emergencies, such as hypoglycemia, in the dental chair (Table I). Ultimately, by taking a few precautionary steps and looking at the overall health of the patient, as well as periodontal health, dental professionals can aid in playing an essential role in the treatment of patients with diabetes.³⁵

Cardiovascular Disease

Although bariatric surgery resolves conditions associated with cardiovascular disease, including hypertension and dyslipidemia (in 43 and 70% of patients respectively), the disease may still be a condition that has to be managed. In order to safely treat patients with a history of cardiovascular disease, the clinician needs to minimize hemodynamic changes.⁶ If a patient has a history of ischemic heart disease, cardiac arrhythmias, cerebrovascular accident or anti-coagulant therapy, the following approaches to minimizing hemodynamic alterations should be implemented: shorter appointments in the morning so the patient is more rested and able to withstand stress, profound local anesthesia for pain control, possible conscious sedation and adequate pain control post-operatively.⁴⁴

Hypertension blood pressure is a parameter that

should be routinely monitored to identify those patients at risk for hypertension and/or medical emergency during dental care. Hypertension affects 1 in 3 people in the United States.⁴⁵ Stage 1 hypertension is defined as a common, often asymptomatic disorder characterized by elevated blood pressure persistently exceeding 140/90 mmHg.⁴⁵ The National Institutes of Health's joint commission defined 4 levels of classification for blood pressure in adults (Table II).

Epidemiologic evidence suggests an association between hypertension and periodontal disease in a dose-dependent fashion, meaning that higher blood pressure is associated with more severe periodontitis.⁴⁶ A dental consideration for hypertensive patients is use of local anesthetic containing a vasoconstrictor, such as epinephrine, since there is a small risk of adverse events.^{47,48} "Safe and effective periodontal management of such patients requires close medical and dental coordination, an understanding of the potential hazards during dental treatment, knowledge of drugs used in treatment of cardiovascular diseases, and the potential adverse effects of drugs commonly used in periodontal practice."⁴⁹ It is important for members of the dental team to have a thorough understanding of cardiovascular disease along with its potential effects on the periodontium in delivery of periodontal therapy.²⁰

Anti-coagulant Therapy

Another medical consideration that must be addressed prior to dental care is patients taking anticoagulants, as this poses a risk for hemorrhage from invasive dental procedures, such as periodontal therapy.²⁰ A medical consultation should precede any invasive dental treatment to determine the patient's most recent Prothrombin-time (Pro-time), international normalized ratio (INR) and potential need to adjust dosage of anticoagulant.²⁰ This is especially critical if the patient requires dental procedures where bleeding is anticipated, such periodontal surgery, NSPT or extractions.⁴⁹ A thorough medical history and consultation with the medical provider prior to starting treatment eliminates a potentially life-threatening medical emergency caused by anticoagulant therapy (Table I).

The literature is clear concerning patients with multiple medical conditions – they require careful consideration. Many of these conditions could have dental implications or affect the course of non-surgical periodontal therapy based upon whether or not the conditions are stabilized and controlled. In order to ensure safety of the patient, clinicians must take steps to gather additional informa-

Table II: Blood Pressure Classifications

Stage	Systolic	Diastolic
Normal	< or = to 120 mm Hg	< or = to 80 mm Hg
Prehypertension	120–139 mm Hg	80–90 mm Hg
Stage 1 Hypertension	140–159 mm Hg	90–99 mm Hg
Stage 2 Hypertension	> or = to 160 mm Hg	> or = to 100 mm Hg

tion regarding the patient's current status from the medical practitioner prior to beginning dental treatment. "The ideal management of such individuals should involve the collaborative efforts of health care providers, nurses, dentists and dental hygienists, thus optimizing treatment and minimizing secondary complications derived from the oral cavity."⁵⁰

Patient Assessment

N.P., a 54 year old Hispanic male, presented to the dental clinic with a chief complaint of "needing to have his teeth cleaned." The patient moved to the United States from Mexico 22 years ago, and has had very limited dental treatment. He was 5'7" and weighed 418 pounds with a BMI of 65.5. Initial vital signs included a blood pressure reading of 116/60 and respirations at 20 breaths per minute. N.P. reported a history of hypertension, hyperlipidemia, pulmonary embolism, bariatric surgery (lap band), Type 2 diabetes mellitus and osteoarthritis. The patient lost 60 pounds following bariatric surgery (gastric lap band) in 2002.

The medical provider was consulted prior to dental treatment due to the medically compromised condition of the patient (Table III). Effective communication between the dental and medical professionals was necessary to ensure that the patient's needs were met and to monitor Pro-time, INR and hemoglobin A1c (HbA1C) levels during treatment. Table I provides an overview of issues addressed with the medical provider as well as their implications of the information for dental care.

N.P.'s health care provider indicated his most recent HbA1c was 8.2%, which equates to an average blood glucose over 182 mg/dl.²⁷ The goal for HbA1c in non-pregnant adults is less than 7% to prevent microvascular complications.²⁷ Re-evaluation of his HbA1c was scheduled for his next medical visit. In consultation with the medical provider, it was determined N.P. should stop taking Coumadin® 2 days prior to each NSPT appointment.

Results

N.P.'s occlusal surfaces exhibited generalized extreme wear and/or erosion, and he complained of dentin hypersensitivity (Figure 2). A caries risk assessment and diet recall was performed to assess the patient's diet to determine its impact on the dentin hypersensitivity and caries risk. During the dietary assessment, N.P. reported severe GER problems limited his food selection.

Periodontal assessment revealed (Figure 3a-d, Figure 4, Figure 5):

- Generalized 4 to 6 mm probing depths on posterior teeth
- Furcation involvement, which included Grade I buccal of the maxillary left first and second molar and ML and Grade II buccal of the maxillary left third molar
- Tooth mobility – Class I maxillary left central incisor
- Bleeding Index: 39.8%
- Plaque Index: 100%

Preventive and Periodontal Treatment

Based on generalized moderate chronic periodontitis as evidenced by clinical attachment loss, radiographic bone loss, furcation involvement, tooth mobility, heavy calculus deposits and bleeding on probing, full mouth NSPT was prescribed along with oral hygiene instruction. Other preventive services to address dentin hypersensitivity and caries risk included fluoride therapy and nutrition counseling.

It is hypothesized that N.P.'s severe GER contributed to generalized occlusal erosion, dentin hypersensitivity and dental caries based on the high incidence of GER in obesity and post-gastric lap band surgery.^{23,25,45} In addition, his dietary recall demonstrated GER impacted his ability to consume an adequate nutrient-dense diet. This had the potential to impact his immune response and ability to heal. His poor dietary intake was also a significant concern in regard to managing his diabetes.

The patient reported for 4 appointments for quadrant NSPT with local anesthesia over a 5 week period. Ultrasonic and hand instrumentation was utilized for debridement and disruption of plaque biofilm and calculus removal. Fluoride varnish was applied to assist with desensitization and caries prevention.

Periodontal re-evaluation was completed 6 weeks following completion of NSPT. Patient's

Table III: Medical History & Medications

Gastric lap band surgery (2002)
Gastroesophageal reflux disease (GERD) <ul style="list-style-type: none">• Medication: None
Pulmonary embolism (July 2007) <ul style="list-style-type: none">• Medication: Coumadin® (Warfarin), 7.5 mg is taken daily in PM
Hypertension and for 20 years <ul style="list-style-type: none">• Medication: Lisinopril 20 mg daily in AM; HCT® (Hydrochlorothiazide) 12.5 mg daily in AM; Lasix® (Furosemide) for diuretic, 80 mg daily in PM
Type 2 diabetes for 22 years <ul style="list-style-type: none">• Medication: Insulin,(Novolog® Mix 70/30 (FlexPen®) daily, usual dosage is 50 units in AM. and 40 units in PM
Hypercholesterolemia <ul style="list-style-type: none">• Lipitor® (Atorvastatin), 20 mg daily in PM
Patient has osteoarthritis and inflammatory rheumatism in back <ul style="list-style-type: none">• No medication

Figure 2a: Maxillary Arch



Figure 2b: Mandibular Arch



Figure 3a: Anterior View



Figure 3b: Buccal Mandibular Left View



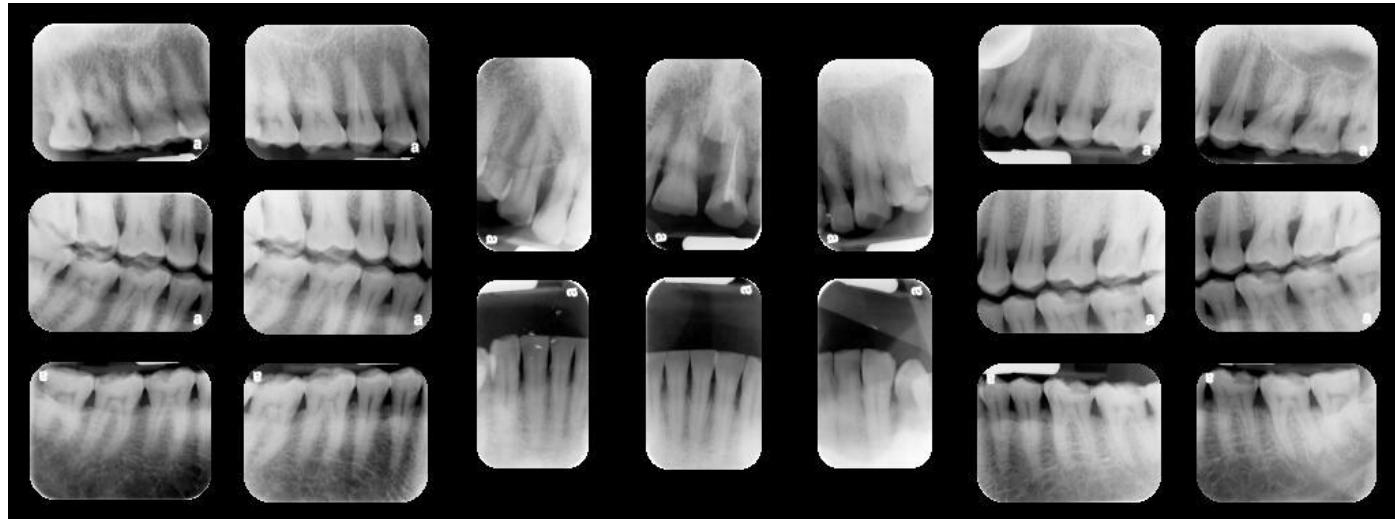
Table 3c: Buccal Mandibular Left Third Molar



Table 3d: Lingual Maxillary Left View



Figure 4: Radiographic Full Mouth Series



bleeding and plaque index improved from 39% and 100%, respectively, at baseline to 4.6% and 40%. Oral self-care was reviewed and reinforced. Periodontal data collection revealed pocket depths improved with all posterior areas measuring 4 mm or less. Monitoring and periodontal maintenance were planned at 3 month intervals. In addition to improvement in periodontal health, N.P.'s patient medical provider reported his HbA1c decreased to 7.7%, an improvement of 0.5% in the 4 months from baseline to re-evaluation. There are many factors that could have contributed to this positive shift in HbA1c levels. However, this is consistent with reductions in HbA1c in research reports following NSPT.³³

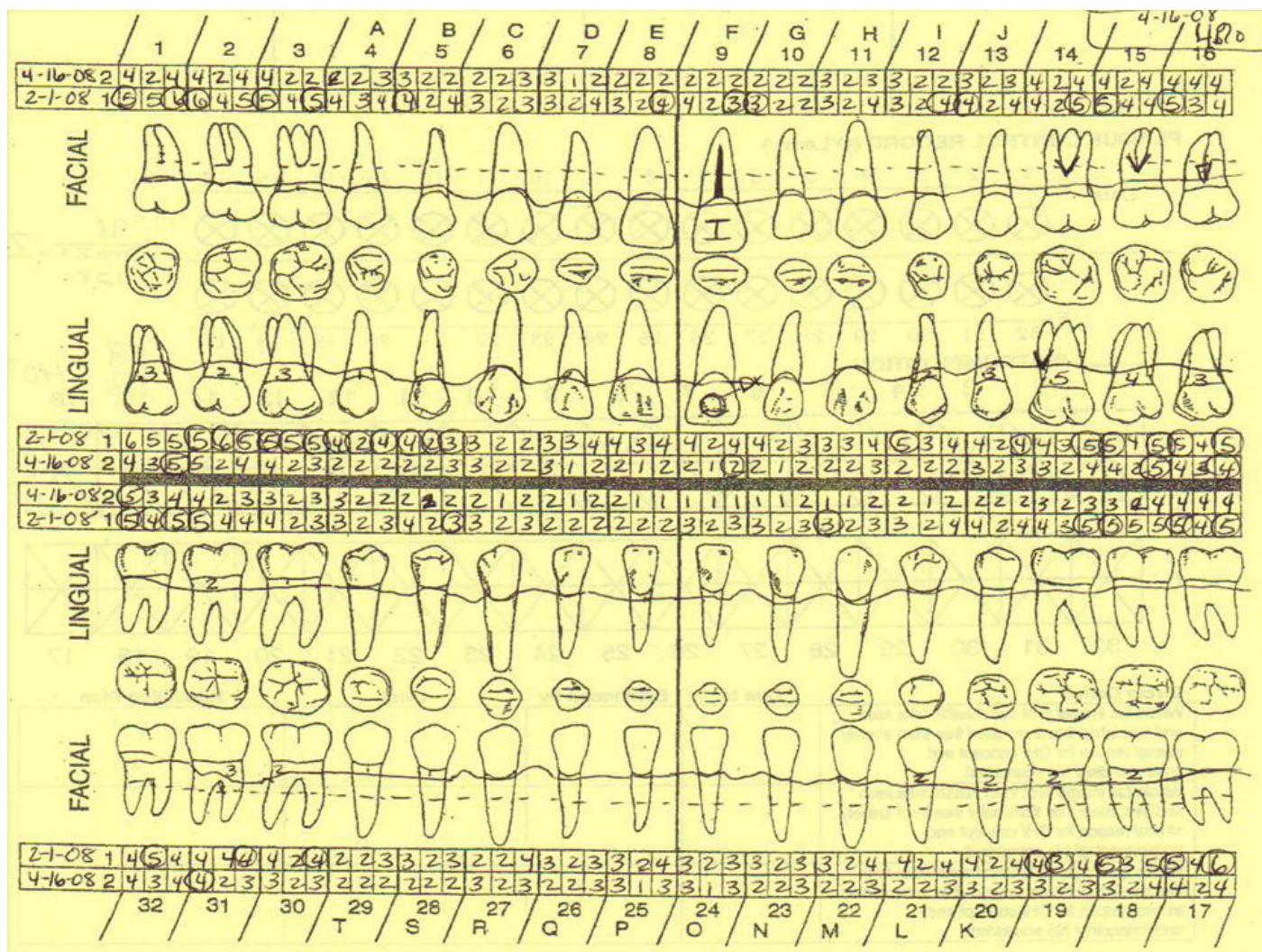
Discussion

This case was representative of issues dental providers face when providing care for bariatric surgery patients. Students, dentists and dental hygienists often learn about medical conditions in isolation, so cases like this present an opportunity to learn how to manage more complex patients seen routinely in dental offices. The role of the dental professional is increasingly challenging as the population grows more medically complex. In

this particular case, significant investigation, consultation and education with the medical provider were required in regard to bariatric surgery and the chronic diseases this patient exhibited prior to providing dental treatment. The medical providers for this case were unaware of the need for the dental professional to be informed about neither glycemic control nor the potential impact that periodontal inflammation might have on diabetes control. Persistence by the dental practitioner was required to gain the necessary information prior to beginning treatment. This case presented the opportunity for educating the medical provider about the oral-systemic link. Even though communication between the dental professional and medical professional is essential to determine the best course of treatment for the medically compromised patient, many medical professionals may have limited knowledge about the oral-systemic connection.

Equally important is the feedback dental professionals can provide to the medical practitioner to help further regulate medical conditions and diseases. This case required follow-up bariatric surgery and surgical replacement of the gastric lap-band with new one, due to the poor weight

Figure 5: Periodontal Assessment



of dental caries, tooth erosion, esophageal cancer and poor healing following NSPT, surgery or extractions as result of nutrient deficiencies. These conditions present opportunities to collaborate with other health care providers to ensure the patients overall well-being.

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