Uncontrolled Dental Caries in a Young Adult:
A Therapeutic Perspective and Case Report

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There has been a significant decrease in the prevalence of dental caries in the United States during the last 30 years. The decrease in dental caries has been most noticeable in fluoridated and economically advantaged areas. Fluoridated water, fluoridated toothpaste, professional dental products, improved dental hygiene, and increased access to dental care have led to this decreased prevalence. Still, dental caries remains one of the most common infectious diseases. The factors related to the development of dental caries are relatively complex in that they are influenced by oral hygiene, individual microbial carriage, salivary composition and production, dietary habits, choice of restorative materials, fluoride exposure, and social, cultural, and economic status. With the advent of minimally invasive dentistry, dentists have been able to take advantage of techniques that focus on assessment and identification of indicators, primary and modifying factors, as well as management of the plaque-biofilm interface in an effort to carry out prevention and enamel remineralization strategies. While caries prevalence in the upper- and middle-class populations has been reduced by public health prevention strategies, the treatment of young adults with uncontrolled dental caries in this urban socioeconomic setting can be sometimes problematic, as many dentists in these settings see few cases represented by this patient population, and thus have little experience in the care and maintenance of these patients’ oral conditions.1-10

The purpose of this article is to present a case of uncontrolled dental caries and discuss issues to be considered in diagnosing and determining the etiology and management of the high-risk caries patient. The individual oral presentation will be reviewed. Primary factors (biological predisposing and protective risk factors) and secondary modifying factors (socioeconomic, education, attitudes, behaviors, and abilities) will be discussed, as they influence the maintenance of the equilibrium among the following 3 prerequisites involved in development of the caries process: plaque/biofilm, tooth, and diet.

**CASE REPORT**

A 24-year-old male patient was referred by his periodontist to an oral medicine clinician with a diagnosis of uncontrolled dental caries. The patient did not have periodontal disease, but was referred by his mother, who believed that she was not receiving satisfactory information and success from the patient’s general dentist regarding the treatment of her son.

The patient presented with an unremarkable medical history and nothing was gleaned from the patient interview that would appear to be contributory to the chief complaint, which was “multiple cavities continue at the regular checkups.” The patient did not smoke cigarettes and drank alcohol in moderation. The patient was not taking any medications and reported no known drug allergies. Recent blood studies were essentially normal, but deficiencies in selenium, vitamin A, chromium, and glutathione were reported. The extra- and intraoral examination of the soft tissues was unremarkable; however, inflammation was noted in the areas where restoration margin conformation was biologically incompatible with gingival health. Mild generalized soft deposits were visible. Also, several defective restorations and areas of recurrent caries were noted. Calculus deposits were detected associated with the lingual and interproximal surfaces of the mandibular incisor teeth.
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A clinical photograph was taken (Figure 1). Upon evaluation of oral hygiene practices, the patient reported brushing with use of a soft electronic toothbrush, twice a day. He denied being a “regular flosser.” The patient reported that he did experience periods of dry mouth, but did not feel dry all of the time. He admitted to recommended use of a remineralizing paste prescribed by his dentist, with application through use of fabricated flexible trays.

An extraoral examination revealed an absence of palpable lymphadenopathy. The parotid salivary glands did not demonstrate function upon stimulation. Normal function of the submandibular salivary glands was evident. Clinical examination and evaluation of bite-wing and periapical radiographs revealed generalized restorative treatment in varying degrees of repair (open and poorly contoured margins and surfaces) and primary and recurrent carious lesions present anteriorly and posteriorly in both arches.

The radiographs (Figure 2) revealed teeth Nos. 1, 17, and 32 to be impacted. Tooth No. 14 appeared to be missing. A diastema was present between teeth Nos. 11 and 12. Teeth Nos. 15 and 16 had migrated mesially into contact with tooth No. 13. Several white spots in the enamel surface were noted; the majority appeared to be associated with enamel hypoplasia as evidenced by their generalized position. However, at the cervical aspects of teeth Nos. 28 and 29, there appeared to be white spot lesions with roughened surfaces that were characteristically different from the generalized white areas that appeared to be smooth, hard, and consistent with a diagnosis of enamel hypoplasia.

The patient's history, radiographs, and clinical evaluation demonstrated interproximal dental caries, gingival inflammation, and a history of restorations completed during the last 3 years. He also demonstrated inadequate oral hygiene, decreased salivary flow, and problematic dietary habits. The patient was counseled and given home care strategies regarding oral hygiene and diet, and their impact on the existing condition of xerostomia and its management. He was also educated about his restorative needs to correct existing restorations and treatment of his existing carious lesions. Finally, he was directed to return to the referring periodontist and ultimately advised to seek rehabilitation for his current condition through care given by a general dentist.

DISCUSSION
Caries Risk Assessment

When a patient presents for examination and dental treatment with the clinical picture that this patient did, it is important to gather as much information as possible in order to determine the specific factors involved in the progression of the condition. Featherstone et al. first introduced the concept of “caries balance” and presented a simplified approach to understanding the key factors involved in the development and reversal of dental caries. The balance pertains to the ratio between factors of pathologic origin (plaque, frequent snacks, diminished salivary flow, high bacterial count) and of a causal nature (deep pits and grooves, recreational drugs, medications and conditions affecting salivary function, exposed roots, and prostheses [orthodontic and prosthodontic]) as compared to protective factors (biologic or therapeutic) impacting pathologic challenges.

These variables, collected in a structured format, are used to complete the caries risk assessment (CRA) form, which can be preformatted. Forms can be developed for the clinician's use or retrieved from websites, such as ada.org (if the clinician is an ADA member), for use for a child aged zero to 6 years or individuals > 6 years of age.

As previously stated, this process enables assessment of causative and protective factors, as well as the indicators which provide evidence of disease (cavitations, radiographic proximal lesions, white spot lesions, and a history of recent restorations). There are a number of CRA forms available to document the patient's existing condition for baseline and recall reference. Based upon the presence of carious lesions and the balance among factors, patients may be classified as high, moderate, or low risk for caries development. The data collected assists the clinician in making decisions about treatment and monitoring disease progression and resolution, and can assist in determining any other needed diagnostic information.
The CRA should be accomplished for all patients with a dentition, as it is the dentist’s responsibility to provide comprehensive care based upon the principles of restoring oral health, form, and function in as noninvasive a manner as possible. By evaluating the caries balance through risk assessment specific to each patient’s condition, a personalized preventive protocol and treatment plan aimed at disease removal and rehabilitation can be provided for each patient.14,15

Caries Diagnosis
Traditional methods of caries detection involve visual, tactile, and radiographic interpretation. Surfaces should be clean and dry so that changes represented by the demineralization/remineralization processes in pits, fissures, and smooth surface enamel can be readily identified. Probing should be avoided, but if used, exploration should only be accomplished for the purpose of removing debris from the depths of pits and fissures and other retentive surfaces. Care is imperative with the probing technique in order to avoid the transmission of cariogenic bacteria and iatrogenic trauma to demineralized and weakened enamel. Therefore, it is important to consider that visual inspection is preferred over the use of probing, and that probing is less accurate than the visual approach to caries identification.16 Caries is a dynamic process with periods of remineralization followed by demineralization; identification of small or incipient lesions is of great importance.3,11,17

During the CRA interview for the patient in this case report, he disclosed that he did snack frequently between meals and did not always have the opportunity to brush his teeth, nor did he floss with regularity. He also admitted to drinking high carbohydrate content sodas and juices without the benefit of rinsing or brushing his teeth after consumption. As the patient appeared to exhibit signs of parotid salivary gland dysfunction, these patient interview reports and clinical findings should be documented. Based upon the findings from this interview and the clinical findings (caries, salivary dysfunction, frequent nonhealthy snacking, etc), a classification of high-risk caries may be determined.

When considering where to start in the management of the high-risk caries patient, one must first consider his/her own modifiers as a dentist. Trained by advocators of the principles of G. V. Black, it is very easy to maintain the modalities of a surgical intervention which originally involved the concept of “extension for prevention” (currently, the concept of extension for prevention is not an evidenced-based view). During the last 20 to 30 years, the medical model of caries management, with dental caries regarded as an infection, has evolved into a number of strategies aimed at minimal surgical intervention. Impediments to these conservative concepts have a negative impact on therapeutic success; namely, lack of a comprehensive understanding of what conservative therapy actually involves, lack of support on the part of insurance agencies in remunerating dentists for preventive protocol
strategies, and lack of cooperation of the patient (who may not fully understand the concept, or may have concerns regarding the expense of preventive treatment). \(1,3,4,18\)

One must take into consideration the patient as a whole and also have a realization that dentists in middle- to upper-class geophysical regions often do not have experience in the diagnosis and treatment of adults with uncontrolled caries. The demographics tend to favor less caries prevalence in economically advantaged regions. For the treatment of such patients, it is necessary to have an understanding of the condition, its pathophysiology, and the structured ability to assess the caries risk of such patients in order to formulate a viable treatment protocol. Furthermore, it is advantageous to have knowledge of appropriate restorative materials that contribute to caries control success.\(3,4,11,17,19\) By reviewing the patient’s medical history, one can determine if there are over-the-counter or prescribed drugs which may have an impact on saliva production. Furthermore, a clinical evaluation of the patient’s saliva production and counseling regarding dry mouth strategies are helpful.\(20,21\)

The successful treatment of uncontrolled dental caries necessitates an understanding of the pathophysiology of the caries process, methods of detection and diagnosis, and contributing factors such as xerostomia, poor oral hygiene, plaque/biofilm, impact of diet, and demineralization/remineralization activity at the tooth surface. Further, a knowledge of the nature of chemotherapeutic agents, the dental materials useful in caries prevention, and therapeutic and preventive strategies implemented in order to restore the balance in patients with uncontrolled dental caries are important.

A further contribution to this discussion includes cultural and economic issues. With the advent of fluoridated water supplies, dental caries—and particularly the uncontrolled dental caries condition—is much less prevalent today. The case presented represents a patient from an upper-middle-class region. Such a patient presents an unusual case for dentists practicing in a location where uncontrolled caries is not the norm. As such, dentists within geophysical locations with low caries rates may be unaccustomed to treating patients with uncontrolled caries.\(18,22-24\)

Phased Treatment

Modern treatment planning is based upon phasing therapy. In essence, the best outcomes occur with first controlling medical conditions and urgent matters. Stefanac and Nesbit\(25\) recognize 5 phases in treatment planning. The first 2 steps represent Phase I: Systemic, and Phase II: Acute Aspects of the Phased Treatment Plan. Once the medical and urgent issues are stabilized, a comprehensive oral examination that identifies problems and diagnoses of the existing conditions can begin.

Identifying the diseases to be controlled is the next step in the phased treatment plan, Phase III: Disease Control. After all diagnostic data are acquired, of which a CRA is vital, the interpretation of such is important. From this assessment, the factors involved in upsetting the balance among plaque/biofilm, saliva, and diet, as well as the existing preventive activities of the patient, can be determined. A well-planned caries control strategy can be developed and implemented with patient approval and commitment. Patient education and compliance with scheduled recall and monitoring is important to maintenance strategies. Just as periodontal disease has a firm foothold in assessment, diagnosis, treatment, and maintenance, so should the management of dental caries. While dental caries is not a recognized specialty, it is one of the most commonly occurring diseases of the oral cavity and deserves similar attention.\(25\)

In managing this disease, it is essential to develop a caries control protocol that focuses on the etiology of the caries condition of the individual patient before entering into Phase IV: Definitive Care of the phased treatment plan, placing permanent restorations. Identifying the particular etiology of caries in patients with uncontrolled caries is especially important and includes determining the presence of infectious bacteria (\textit{Streptococcus mutans, lactobacillus,} decreased salivary flow, poor diet, and poor oral hygiene. In order to provide a successful treatment outcome, it is imperative to identify the balance between individual causative and protective factors and successfully address these issues for each patient.\(2,14,30\)

Once the disease control phase of the plan has been implemented and after evaluation of the outcomes of treatment has revealed stabilization of all active disease processes, the patient can continue to Phase IV: Definitive Care. Phase V: Maintenance should be carried out to encompass reinforcement of disease control prevention, as well as recall for evaluation of restorations and prostheses placed in the definitive care phase to confirm absence of any deleterious effects on the existing stabilized condition.\(25\)

Treatment should begin with an oral examination and assessment process that leads to the identification of problems requiring diagnosis, planned treatment, and conditions to be maintained. Oral hygiene instructions and patient education (to include how dental caries and gingival disease happen) specific to each individual patient’s needs are important to the maintenance
of a healthy oral condition. First, evaluate the patient’s oral hygiene skills and demonstrate and reinforce accurate technique. Then, impart the importance of good brushing, flossing, and frequency associated with food intake. Next, emphasize oral hygiene as a daily habit and the importance of compliance. Other adjuncts to therapy used in the control of dental caries include chlorhexidine, nutritional counseling, fluorides (varnish, pastes, rinses), calcium phosphate-containing materials (Recaldent, MI paste [GC America]), xylitol chewing gum, products used in managing xerostomia, dental floss and flossing aids, electric toothbrushes, water irrigation devices, and simply rinsing with water. After the patient is stabilized, definitive care and maintenance plans, with options, can be presented to the patient.25,26

With regard to dental restorative material therapies, dental amalgam is a superior (with regard to longevity) restorative material for posterior tooth restorations in patients with a high caries index or a previous history of uncontrolled dental caries. In large and deep Class II caries below the cemento-enamel junction, bonded resin restorations may be problematic due to the requirements for moisture control and isolation. Neither dentin nor cementum bonding is as strong as enamel bonding, and the thermal coefficient of expansion and contraction are less favorable with composite restorations compared to amalgam restorations.37-35 Also, oral bacteria are more problematic with resin restorations compared to amalgam restorations.36 However, several new posterior restorative materials demonstrate relative success. In the anterior region, materials such as glass ionomer, and restorations using the sandwich technique that utilize both glass ionomer and composite restorative material, are useful, as is fluoride rechargeable composite restorative material. The choice of dental materials, particularly with regard to posterior restorations for individuals with a high caries index, is an area of controversy. Many dentists utilize Class II posterior composite restorations because of unfounded concerns regarding the toxicity of dental amalgam.33-35 Dental implants are also a good choice for replacing teeth loss due to dental caries infection.38

CONCLUSION
Every patient in a dental practice deserves a CRA to include a thorough evaluation of preventive and contributing pathologic factors that may impact the ability to maintain a healthy and disease-free oral environment. Dentists need to avail themselves of opportunities that enhance their practice through continuing education and dedicate themselves to lifelong learning in this area. Through continuing educational experiences and self-directed learning, practitioners can enhance their clinical expertise with regard to an understanding of caries pathophysiology, caries management by risk assessment, patient education practices, and evidenced-based treatment modalities in the treatment and control of dental caries.●
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References

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1. The following is/are related to the development of dental caries:
   a. Individual microbial carriage.
   b. Salivary composition and production.
   c. Dietary habits.
   d. All of the above.

2. In the case presented in this article, the patient’s parotid salivary glands did not demonstrate function upon stimulation.
   a. True.
   b. False.

3. Featherstone et al first introduced the concept of and presented a simplified approach to understanding key factors in caries development/reversal.
   a. Xerostomia.
   b. Caries balance.
   c. Dietary imbalance.
   d. None of the above.

4. Caries factors of pathologic origin include:
   a. Recreational drugs.
   b. Deep pits and grooves.
   c. Diminished salivary flow.
   d. Exposed roots.

5. Caries factors of a causal nature include:
   a. Plaque.
   b. Frequent snacks.
   c. High bacterial count.
   d. Medications affecting salivary function.

6. Indicators which provide evidence of caries disease include:
   a. Cavitations.
   b. White spot lesions.
   c. Radiographic proximal lesions.
   d. All of the above.
7. When diagnosing caries, visual inspection is preferred over the use of probing. Probing is less accurate than the visual approach to caries identification.

a. The first statement is true, the second is false.
b. The first statement is false, the second is true.
c. Both statements are true.
d. Both statements are false.

8. Stefanac and Nesbit recognized _____ phases in treatment planning for uncontrolled caries.

a. 2.
b. 3.
c. 4.
d. 5.

9. Adjuncts to therapy used in the control of dental caries include:

a. Chlorhexidine.
b. Calcium phosphate-containing materials.
c. Xylitol chewing gum.
d. All of the above.

10. Oral bacteria are more problematic with resin restorations compared to amalgam restorations.

a. True.
b. False.
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5.  ☐ a  ☐ b  ☐ c  ☐ d
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