Tobacco Smoking and Dental Caries

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INTRODUCTION

My first visit with Patient RP was September 2019 at NYU College of Dentistry for evaluation of post and core and PFM crown for tooth #31 following root canal therapy. I completed a comprehensive examination during that visit while addressing the restorability of #31. I also took diagnostic models and treatment planned a restorative plan for #31 which include prefabricated post, core buildup, and PFM crown. After taking a full mouth series of intraoral radiographs, clinical exam, and going through the patient's medical and social history, I discovered the patient had rampant dental caries and needed a more comprehensive restorative plan than just for tooth #31. The patient was a pack a day smoker so the question I asked myself was "does tobacco smoking play a role in dental caries risk?"

PATIENT RP

CC: "I have a throbbing, pulsating pain on the lower right that keeps me up at night and I want to fix my upper front tooth that looks like a hook"
Medical Hx: Moderate anxiety, panic attacks, no reported medications, NKDA
Dental Hx: Existing restorations on #2, 3, 4, 13, 15, 18, 19, 29, & 30. #30 and 31 RCT and #30 gold crown. Last dental visit December 2015 EXT #14. Brush twice daily, rarely flossed, no use mouth rinses
Social Hx: Middle aged Caucasian male middle socioeconomic class. Self-pay. No EtOH. Tobacco: smoked pack a day. Occasional use recreational drugs (marijuana and cocaine)
EOE: No lymphadenopathies or asymmetries were observed. TMJ: crepitus (-), popping (-), clicking (-), deviation (-), joint tenderness (-), and muscle tenderness (-)
IOE: No soft tissue findings. FOM soft. Generalized plaque, caries (#7DILF, 8ML, 10ML, 10DL, 11ML, 11DL, and 13MO). Class II molar and canine occlusion on both the right and left sides. Severe overbite and moderate to severe overjet. Severe anterior crowding in the maxilla and moderate anterior crowding on the mandible. Many of his anterior teeth were malpositioned and rotated

Appendix

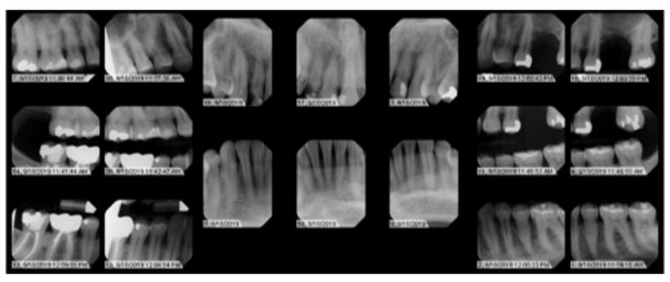
A: Maxillary Occlusal

B: Mandibular Occlusal

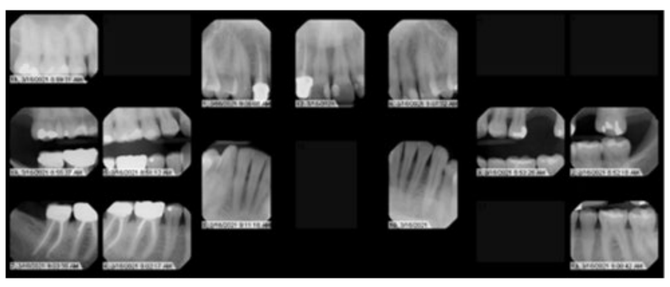
C: Anterior

D: Left Lateral

E: Right Lateral



F: FMX September 2019



G: FMX March 2021

METHODS

I conducted a literature review with the aim to find an association with tobacco smoking and dental caries with the following PICO.

Population (P): Healthy adult patients
Intervention (I): tobacco smoking
Control (C): non-smokers
Outcome (O): decayed, missing, and filled teeth/surfaces (DMFT(S))

Clinical question: 'whether smoking tobacco users have a higher incidence of dental caries than non-smokers?'

I went onto PubMed and searched 'smoking tobacco' and 'dental caries'. I looked for articles within the past ten years and those that studied adults. I found four articles that satisfied my search criteria with each having a different methodology as to why tobacco smokers may be more susceptible to dental caries.

"CORRELATION BETWEEN TOBACCO SMOKING AND DENTAL CARIES: A SYSTEMATIC REVIEW AND META-ANALYSIS" JIANG ET AL.

This systematic review aimed to evaluate the association between tobacco smoking and dental caries. The results of the study using DMFT as the outcome measure found the mean difference of 1.20 (95% CI: 0.04-2.00) p=0.003 comparing caries in smokers and nonsmokers.[5] With a mean difference of 1.20, the prevalence of dental caries in smokers was higher than that of nonsmokers.[5] The data of DMFS as the outcome measure was a mean difference of 1.88 (95% CI: 0.99-2.77) p<0.0001.[5] Again, the prevalence of dental caries in smokers was significantly higher than caries in nonsmokers.[5] Both these results were statistically significant. This article supported that there is a positive association between dental caries and tobacco smoking.[5]

"TOBACCO USE AND CARIES INCREMENT IN YOUNG ADULTS: A PROSPECTIVE OBSERVATIONAL STUDY" PETERSSON ET AL.

This was a prospective observational study conducted in Sweden in which the authors aimed to investigate both smoking and smokeless tobacco as determinants of dental caries in young adults. The results of the study found that tobacco users in any form had much higher dental caries than nonusers.[6] The main driver behind that result were smoking tobacco users.[6] Nonsmoking tobacco users had a similar DFS to that of no tobacco users.[6] At the baseline, no tobacco use participants had a DFS of 4.0 and after three years had a DFS of 5.0.[6] Smokeless tobacco users started with a DFS of 3.6 and ended with 4.4.[6] Smoking tobacco users started with a DFS of 5.6 and ended with 7.1.[6] Smoking tobacco users has a changed in DFS of 47.3%.[6] No tobacco and smokeless tobacco users changed their DFS 32.6 and 27.0% respectively.[6] This study found a statistically significant (p<0.01) difference between prevalence of dental caries as measured by DFS levels in smoking tobacco users versus no tobacco use.[6] The relative risk ratio of smoking tobacco for dental caries was 1.5 (95% CI: 1.2-1.7).[6]

"ASSOCIATION OF DENTAL CARIES AND SALIVARY SIGA WITH TOBACCO SMOKING" GOLPASAND HAGH ET AL.

This study looked to determine the salivary sIgA in tobacco smokers and nonsmokers and how they related to dental caries. Seventy healthy subjects age nineteen to forty-five-years-old from a city in southwest Iran (Ahvaz) were enrolled into the study and divided into four groups: smokers with dental caries, smokers without dental caries, nonsmokers with dental caries, and nonsmokers without dental caries. The subjects were selected at random as patients of the Ahvaz Dental School. Caries status was determined by the decay surface index using radiographic and clinical exams. The salivary sIgA was measured in all four groups using ELISA. The results of this study found that smokers showed a lower concentration of sIgA than that of nonsmokers (20.9 +/- 4.8 vs. 93.7 +/- 12.4, p < 0.0001) and higher number of dental caries.[4] The subjects with the highest levels of sIgA were in the nonsmoking caries-free group compared to the caries-active smoking group (123.2 +/- 19.9 vs. 13.3 +/- 4.1 lg/ml respectively, p < 0.001).[4] They concluded that low concentrations of salivary sIgA are correlated with a statistically significantly higher dental caries prevalence in tobacco smoking.[4]

"THE EFFECT OF SMOKING ON CARIES-RELATED MICROORGANISMS" WU ET AL.

This study searched to determine what effect cigarette smoking and nicotine have on caries-related microorganisms. The researchers collected evidence on how smoking and cigarette products influence saliva and dental plaque in vivo as well as how they influence growth and metabolism in vitro. In general, the authors found that the growth of cariogenic microorganisms was enhanced by components of cigarettes such as nicotine.[8] Streptococcus sanguinis which is found in high numbers in a healthy oral cavity showed less competitive capability in the presence of nicotine.[8] Not only did nicotine enhance the cariogenic bacteria, Streptococcus mutans and Lactobacilli, but it also hurt the good microflora in the oral cavity.[8] Tobacco smoking promoted the formation of a caries-susceptible environment by allowing cariogenic bacteria such as S. mutans outcompete caries-benign bacteria S. sanguinis.[8]

CONCLUSION

Based on my literature review, there is evidence supporting an association between tobacco smoking and the prevalence of dental caries. My first article, the systematic review, concluded there is a correlation between dental caries and tobacco smokers.[5] My second article, the prospective observational study, determined that tobacco smoking is a risk factor for caries in young adults.[6] The third article found an association of increased dental caries and lower salivary sIgA concentrations with tobacco smokers[4], such as my Patient RP. Lastly the final article in my literature review concluded cigarette smoking and nicotine exposure promoted cariogenic bacteria while impairing microorganisms found in healthy caries-free oral cavities.[8] The recommendations for treatment of my Patient RP based off my literature review are as follows. It is important to promote smoking cessation to my patient for not only his general health, but also to reduce his caries risk. I will have to include smoking cessation along with medical and surgical treatment to manage his caries.

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