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DENTAL HYGEINISTS CLINICAL ASSESSMENT OF DENTAL CERVICAL LESIONS

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A.A.S., DENTAL HEALTH, SANTA FE COMMUNITY COLLEGE, 2011

B.S., DENTAL HYGIENE, THE UNIVERISTY OF NEW MEXICO, 2014

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DEDICATION

First and foremost, this body of work is dedicated to my children. May this help to inspire them to always work hard and never give up on what matters most in life. Nothing worth having comes easy, and often times we learn more from the journey than we do from reaching the destination.

Above all, thank you to my Lord and Savior. My faith is what has carried me through my educational, professional, and personal endeavors. To my family and friends, your endless love, support, and encouragement has always pushed me to reach the goals that I have set fourth for myself.

To my professors, instructors, and fellow RDH's, you have been my inspiration in wanting to become a proactive member of the dental healthcare team. You have all instilled in me your love and commitment to the profession. Your dedication to teaching and to dental hygiene is what has helped to mold me into the dental hygienist that I am today.

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ABSTRACT

Dental hygiene is among one of the fastest growing career fields in the healthcare system. With dental hygienists spending a considerable amount of time with their patients during periodic recall appointments, it is important for dental hygienists to be calibrated with one another in how they recognize and aid in recommending treatment options for certain dental conditions. Dental cervical lesions is one of the most commonly seen oral implications in the dental office, many times being associated with tooth sensitivity. With the array of etiologies and treatment options for dental cervical lesions it is important to see if this same calibration amongst dental hygienists exists when it comes to assessing and recommending treatment options for dental cervical lesions.

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Chapter I

Introduction

Most dental providers will agree that tooth sensitivity is one of the most common chief complaints of patients. Anywhere between 8-57% of patients will report that they regularly experience tooth sensitivity. (1,2) The wide range could be related to different methods used to diagnose this condition and whether prevalence was assessed by clinical examination and/or questionnaires. (1) Tooth sensitivity is often attributed to exposed dentin. There are various reasons to explain why exposed dentin occurs, including toothbrush abrasion, erosion, attrition, or abfraction lesions. Depending on the etiology of the lesion there are various treatment options that can be recommended. In order to provide the correct assessment and treatment recommendation, a comprehensive medical and dental history should be conducted as well as a comprehensive dental exam that includes evaluation of the temporomandibular joint (TMJ), oral cancer screening (OCS), occlusion, intraoral photos, periodontal evaluation, and hard and soft tissue charting. Unfortunately, often times not all of these steps are followed when it comes to seeking the etiology of these lesions and many times recommendations are made solely on which type of treatment the dental provider most often prefers to perform. Exploring all of these types of cervical lesions, their etiologies, and treatment options is critical to providing proper treatment to each patient.

As a dental hygienist, it is important to recognize these cervical lesions and educate patients on them as many times some patients do not even know they exist. In a dental office that offers Invisalign® in their practice, dental hygienists may attribute patients' cervical lesions to a misalignment of their teeth and they may recommend

orthodontic treatment. In an office where they focus on TMJ issues, dental hygienists may attribute the cervical lesions to parafunctional habits such as clenching or grinding thus night guards are typically recommended. Although many treatment options seek to address the etiology of the lesion itself, some options are recommended solely to alleviate the symptoms associated with the lesion. (3) For example, due to increased sensitivity associated with cervical lesions, many general practice providers tend to recommend a traditional glass ionomer restoration to restore the exposed dentin. Other providers recommend fluoride treatments, including topical fluoride varnishes or desensitizers such as GLUMA®. So, there are many different treatment options for these lesions. This study will assess how dental hygienists' recognize, assess, and provide education on the treatment options for cervical lesions.

Statement of the problem

Which etiological factors do dental hygienists cite when describing dental cervical lesions?

What treatment options are majority of dental hygienists recommending for cervical lesions?

Significance of the problem

According to the Bureau of Labor Statistics, between the years of 2014 to 2024 the number of registered dental hygienists is expected to grow by approximately 19% which is significantly higher than average (4). As a member of a healthcare team, it is imperative that registered dental hygienists strive to provide the best care to patients. With any healthcare career it is important for healthcare professionals to be consistent and calibrated in diagnosing, patient education, and treatment recommendations. Pertaining to dental hygiene specifically, this is regulated though accredited dental

hygiene schools' curriculum and again through national, regional, and state board examinations. With so many different treatment options it is many times overwhelming for a patient to be confident in making the correct decision pertaining to their own dental health.

Dental hygienists spend the majority of time with patients during periodic recall visits. Working in such close proximities with patients, so much trust is gained between patient and provider and many times patients rely on the dental hygienist for guidance when it comes to making the best decision about the dentists' recommended treatment plan. Often times dental hygienists are asked by their dentists to have the conversation with a patient when they recognize a problem area, educate the patient of the problem, and discuss possible treatment options. The dentist will then be the one to confirm and officially diagnose the issue and recommend treatment. With so much trust and responsibility, from patients as well as their dentists, dental hygienists need to always be confident in recommending the best treatment to patients and calibration and consistency are key to making sure that the patient would receive the same recommendation no matter which dental office they went to.

Operational Definitions

- Abfraction- Pathologic loss of tooth structure from occlusal biomechanical loading forces on the tooth
- Abrasion- Pathologic tooth wear caused by a foreign substance (tooth brush)
- Attrition- Tooth-to-tooth wear from opposing tooth contact
- Erosion- Loss of tooth structure as a result of chemical agents
- NCCL- (Non-carious cervical lesion) Loss of tooth structure near the cementoenamel junction, usually on the buccal surfaces of teeth, resulting

in a grooved or wedge-shaped area of missing tooth structure in the absence of decay

- Bruxism- An involuntary oral habit of grinding, clenching, or clamping the teeth outside the chewing range

Chapter II

Review of the literature

Introduction

Teeth are formed by different layers; the pulp-the innermost layer which houses the nerves and blood tissue, the dentin-which is the layer that surrounds and covers the pulp of tooth, the enamel-which is the outermost layer of the crown of the tooth and is the hardest and most mineralized tissue in the body, and the cementum which covers the dentin in the root of the tooth. (5) Teeth are also composed of a crown and root. Where these two meet is often referred to as the neck of the tooth. This is the location where cervical lesions occur. There are many different factors that can cause cervical lesions as well as various treatment options. Cervical lesions lead to exposing the dentin of the tooth. Exposed dentin is not as mineralized as enamel and can be worn down further by other forces. This is a very vulnerable area of the tooth and needs special attention. These lesions are often broken up into two main groups; cervical lesions, which could include caries at the cervical 1/3 of the tooth, and non-carious cervical lesions (NCCL). This research will be focusing on non-carious cervical lesions. The most common causes of cervical lesions include abfraction, abrasion, attrition, and/or erosion.

Abfraction Theory

Non-carious cervical lesions are most often categorized by their appearance which is typically wedge-shaped, disk-shaped, flattened, & irregular. (6) The original concept was that occlusal loading could cause cervical stress which would result in loss of cervical tooth structure. Lee and Eakle proposed that the direction of the lateral force(s) acting on a tooth would determine the location of the lesion. For example, if there were

two or more lateral forces the result would be a NCCL composed of two or more overlapping wedge-shaped NCCLs. They also acknowledged that local factors, such as abrasion, might also modify the appearance of these lesions. (7) This concept was first introduced in 1907 when Miller published an article discussing these particular findings however, the concept did not begin to really evolve until the late 1970's. In the 1980's McCoy questioned the etiology of these lesions which were previously referred to as cervical erosion and were thought to be the product of toothbrush abrasion. In the early 1990's it was McCoy and Grippo who proposed that the etiology of these lesions may possibly be in fact due to bruxism, grinding/clenching of the teeth instead.

The actual term "abfraction" was given by John O. Grippo in a 1991 journal article which he wrote specifically distinguishing this lesion apart from the more commonly known lesions of abrasion, attrition, and erosion. (6) The article, "Abfractions: A New Classification of Hard Tissue Lesions of Teeth" established abfractions as a new form of lesion. In the article Grippo defined an abfraction as a "pathologic loss of hard tissue tooth substance caused by bio mechanical loading forces" (8). The term abfraction comes from the Latin origin and means "to break away." (8) Grippo suggested that abfractions alone was the primary cause of cervical lesions whereas others including Lee, Eakle, and Spanger proposed that there were many factors contributing to cervical lesions including anatomy, the distribution of forces, development of caries, and occlusion. Most research and studies support the proposition of abfraction lesions being multifactorial and say that you cannot base an abfraction lesion on a single etiology. The theory behind these lesions states that due to the cervical area of the tooth being the most vulnerable, occlusal compressive forces and tensile stresses cause tooth flexure which results in

micro fractures of the hydroxyapatite crystals of the enamel and dentin. This causes even further fatigue and deformation of the tooth structure. (8)

There have been many studies done to attempt to prove this theory of occlusal loading leading to abfraction lesions. Romeed *et al*., investigated the biomechanics of abfraction lesions in the upper canine teeth under axial and lateral loading conditions, using a three-dimensional finite element analysis. It was found that the stresses were concentrated at the CEJ in all scenarios. Lateral loading produced the maximum stress, greater than axial loading, although the pulp tissues experienced minimum levels of stress. (6)

Palamara *et al.,* found that teeth exposed to 500 newtons loading over 200,000 to 500,000 cycles, while immersed in water, demonstrated microfractures and small areas of enamel loss when examined under scanning electron microscopy at 200× to 1200× magnification. (7)

Litonjua *et al.,* conducted an experiment to determine the effect of axial and non-axial forces on the initiation and progression of NCCLs in teeth that were also subjected to toothbrush abrasion. They found that axially loaded teeth that were subjected to toothbrush abrasion exhibited significantly less cervical tooth substance loss than control teeth that were not loaded. Non-axially loaded teeth that were simultaneously subjected to toothbrush abrasion showed similar amounts of cervical wear to control teeth that were not loaded. (7)

Staninec *et al.,* investigated the magnitude and location of tooth structure loss using sectioned segments of tooth structure that were subjected to cyclic mechanical loading.

Despite the obvious limitation of using sectioned segments of tooth structure, they found that there was a greater loss of material in high-stress areas, supporting the possibility of abfraction. (7)

Another big study experiment similar to the last found out of the Journal of Academy Sciences of Bosnia and Herzegovina (9) used three dimensional models to test the forces of occlusal load on a mandibular first premolar. The results showed that stress values are higher with eccentric occlusal forces in all tooth tissues and occlusal load leads to significant stress in the cervical part of the tooth.

It is important when discussing NCCL that we also touch on some of the other possible causes besides abfraction which can include attrition, abrasion, and erosion.

Attrition

Attrition occurs from tooth-to-tooth contact of masticatory forces without the presence of food (i.e. tooth grinding). Typically, it is characterized by the facet that is matched by a corresponding facet on a tooth in the opposing arch. When dentin is exposed, it remains flat with no ‘cupping’ or ‘scooping’. In general, well-defined, shiny facets is a good measure for active attrition. (10) Although all teeth microscopically wear from opposing tooth contact, it is excessive wear which is pathologic and may be caused by bruxism, grinding, or clenching. (11)

Abrasion

Abrasion is the mechanical wearing away of tooth substance by forces other than mastication. (5,12) It occurs by the friction of exogenous material forced over tooth

surfaces. (10) The most common abrasive is vigorous horizontal toothbrushing, using a scrub technique. Effects are most often seen when brushing with a medium or hard toothbrush and/or vigorous brushing strokes. Many studies have been done on the effects of toothbrushing on the teeth and most conclude that different variables influence toothbrush abrasion. These variables include brushing technique, force of brushing, duration and frequency of brushing, and type of brush, in particular filament stiffness. (13) Although abrasion is typically associated with toothbrushing, other causes could include occupational relations including "tacks held by carpenters, and pins by dressmakers". (5) Other examples could also include individuals who regularly hold a tooth pick in their mouth or even pipe smokers due to the continuous position of the pipe. The appearance of abrasion typically resembles a scoop in the dentin and can also include pitting, gouge marks and other characteristics of mechanical breakdown. Under magnification, the typical micro wear detail is identified by scratch marks. As opposed to abfraction lesions, scooped dentine is not sensitive, and microscopically, there is a mechanical smear layer over the surface occluding dentinal tubules. (10)

Erosion

Erosion can be defined as the progressive loss of dental hard tissue by acid from a non-bacterial source. (14,15) When acid initially comes in contact with enamel, the partial mineral dissolution causes an increase in surface roughness leaving the enamel surface with decreased hardness (softening). (16,17) This "rougher" and "softer" enamel is more vulnerable to mechanical forces, such as tooth brushing. Abrasive forces partially remove the softened enamel layer and produce slightly smoother surfaces. The acid that causes erosive wear may be classified as intrinsic or extrinsic depending on the source of

the acid from either the stomach (intrinsic) or the diet and other environmental sources (extrinsic). Regurgitation erosion refers to tooth wear caused by the regurgitation of hydrochloric acid from the stomach. This occurs in patients with digestive disorders such as gastroesophageal reflux disease. (14) Stomach acid can also enter the oral cavity during vomiting episodes due to alcohol hangovers, chronic alcoholism, morning sickness associated with pregnancy, eating disorders such as anorexia and bulimia nervosa and with voluntary regurgitation. Dietary erosion is due to food or drink containing a variety of acids such as from citrus and other fruits, fruit juices (citric acid), soft drinks, wine and other carbonated drinks (carbonic acid and other acids), pickles, vinegar dressings and preserves (acetic acid). (14) The clinical appearance of dental erosion also resembles dentinal scooping as a common feature. Differing from abrasion, if the erosion is active, the dentinal tubules remain open resulting in sensitivity, and the depth of scooping perpetually increases. (10) Patterns are moderated by salivary flow and the presence of pellicle, the continual action of acid over time will affect more than just an occlusal surface. Hence, multiple surfaces often become affected to various degrees, removing all traces of biofilm. (10,18)

Treatment of Non-Carious Cervical Lesions

When it comes to treating cervical lesions, it is important to note that some treatment options may be tailored for abfraction lesions specifically and others are used for NCCLs of all etiologies. The first treatment option should be to evaluate if monitoring the lesion would be most appropriate. The decision to monitor cervical lesions could potentially avoid unnecessary treatment and, over time, a more obvious cause (e.g., toothbrush abrasion) may present itself. (8,19) Choosing the best treatment

for these lesions depends on a lot of different factors. The patient's age should first be taken into account. Generally cervical wear is a chronic and slow process so in an older individual if the tooth is expected to last the patients' lifetime without further consequences then it may be appropriate to just monitor the tooth. On the other hand, in a younger individual where the tooth is expected to sustain a long-term prognosis and is at greater risk for continued wear or pulp exposure then intervention may be necessary. Other factors to consider regardless of age are how the lesion compromises tooth vitality and function, the predicted rate of tooth wear, associated pain/sensitivity and esthetics. It also may be appropriate to just monitor the lesions if they are shallow in depth which is considered to be less than 1mm. This can be simply monitored by intraoral photos and/or measuring with a probe. However, the most accurate way to measure and monitor abfraction lesions would be with a scratch test. (20, 7) This is done with a 12 scalpel blade which is used to superficially scratch the tooth surface. Visual observation of the scratch will give an indication of the rate of tooth structure loss. Any loss of definition or the scratch itself indicates active tooth structure loss. If choosing to monitor the lesion, assessment should be performed and documented during regular hygiene visits at least every 6-12 months.

Restoration of Non-Carious Cervical Lesions

When choosing to restore a cervical lesion it should be noted that the actual etiology of the lesion is not being treated. Rather, the clinician is replacing a portion of the tooth which has been lost. Choosing to restore a cervical lesion aids in preventing or decreasing thermal sensitivity, improving aesthetics by patient request, or adding strength to the teeth which has been lost. Another indication for restoration is the fact that cervical

lesions may lead to increased plaque accumulation in the area which may also potentially lead to increased caries or periodontal disease. When choosing to restore any type of lesion the clinician should always perform a risk-benefit analysis and always use logic and good clinical judgement. (21) It is important to note that dental hygienists are not legally allowed to recommend or perform any type of restoration process. Dental hygienists are simply responsible for making an educated decision to refer the patient to a dentist for a complete diagnosis and treatment.

There are a variety of different materials which can be used to restore a cervical lesion. Some of the most common examples include Glass ionomer cements (GICs), Resin-Modified GICs (RMGICs), Polyacid-modified resin-based composites (compomers), composites resins and a combination of the techniques. (6) According to this research, RMGIC should be the first preference. RMGIC/ GIC liner or base with resin composite should be used wherever aesthetics is concerned. RMGICs give better esthetic results than conventional GIC but GICs have been found to perform better than the composites because of their greater resilience allowing the material to flex with the tooth. (6) This is especially important given that restorations in cervical areas have a common tendency to fail due to lack of proper retention. Other reasons for restoration failure include caries, marginal defects, discoloration and sensitivity.

Along with restoration, a variety of treatment strategies have also been proposed. Strategies include occlusal adjustments, occlusal splints, elimination of parafunctional habits, and altering tooth brushing techniques. (6)

Occlusal Adjustment Treatment

Occlusal adjustment has been proposed as an alternative treatment as a result of the reported associations between occlusal interferences and abfraction lesions, loading direction (influenced by cusp inclines) and unfavorable tensile stresses, occlusal adjustment has been advocated to prevent their initiation and progression and to minimize failure of cervical restorations. Occlusal adjustments may involve altering cuspal inclines, reducing heavy contacts and removing premature contacts. (7,8) Occlusal adjustments are often done by way of traditional braces or more commonly now, Invisalign®.. If abfraction is suspected to be a dominant factor in the etiology of NCCLs, then any decision to carry out destructive, irreversible treatment, such as occlusal adjustment, should be considered very carefully as the effectiveness of this type of intervention is not supported by evidence. In fact, inappropriate occlusal adjustments may increase the risk of certain conditions such as caries, occlusal tooth wear and dentine hypersensitivity. (7,8)

Occlusal splints

An occlusal splint is a device which is typically worn at night and can serve many purposes including providing diagnostic information, muscle relaxation, repositioning the condyles of the jaw into centric relation and providing protection from bruxism. Occlusal splints to reduce the amount of nocturnal bruxism and nonaxial tooth forces have also been recommended to prevent the initiation and progression of abfraction lesions. The use of occlusal splints will not reduce the frequency or severity of bruxism. What an occlusal splint does is aid in distributing the forces throughout the entire tooth arch and provides a barrier between the arches of the teeth to decrease the direct pressure load on a particular area of the teeth. While occlusal splints provide a conservative treatment option

for managing suspected lesions and reducing non-axial tooth loading, their effectiveness is still a controversial topic due to the fact that there is no evidence to support their use. (7,8)

Dentinal Hypersensitivity Treatment Options

One of the greatest patient complaints when it comes to cervical lesions is sensitivity. This sensitivity is often related to cold stimuli, the consumption of acidic or salty foods, sweets, or being provoked by tactile sense as in tooth brushing. Dentinal hypersensitivity (DH) is characterized by short, sharp pain in response to a stimulus; typically thermal, evaporative, tactile, osmotic or chemical, and that cannot be ascribed to any other form of dental defect or pathology. (1, 8) Tooth sensitivity may be a temporary symptom associated with early stages of abfraction lesions and can affect patients of any age with its peak occurrence in middle-aged adults. Any tooth may be affected but those most often affected are the canines and first premolars at the buccal cervical margins. Several theories of dentinal hypersensitivity (DH) have been proposed. These include hydrodynamic, odontoblast transduced mechanism and direct innervation theory. (1,22) Due to the chronic nature of abfraction, which is accompanied by the natural process of dentinal remineralization it is thought that naturally the tooth will slowly relieve itself of sensitivity. (8) If sensitivity persists, the exposed dentin may require therapeutic treatment to relieve or eliminate the discomfort. For this there are many options for noninvasive and relatively cost-effective treatments in the form of desensitizers such as GLUMA®. These dentinal desensitizers contain hydroxyethyl methacrylate which blocks the tubules and glutaraldehyde that causes the coagulation of plasma proteins of the dentinal fluid, thus resulting in a decrease of permeability. They also aim to partially or

completely obstruct the open dentinal tubules. (8) Dentin bonding agents and varnishes work as temporary sealants of the dentinal tubules. Other options include in-office fluoride varnish, at-home use of high concentration fluoride and arginine products or desensitizing toothpastes containing potassium nitrate or even silver diamine fluoride. (8) Although many patients have sworn by some of these methods, there is still not enough evidence to concretely conclude their effectiveness.

Summary

Though much of the research points to occlusal loading and stress as the primary cause of abfraction lesions, still not enough studies have been done to make a final conclusion. Some of the evidence suggested against the etiology of abfraction lesions include statements like the following;

"The buccal surface is the most affected, while the lingual surface is the least affected. If flexure of the teeth is responsible, there would be equal damage to both buccal and lingual surfaces. There is little or no evidence of these lesions in prehistorical skulls. NCCLs are found in historical skulls of the sixteenth century (after the invention of tooth powders and toothbrushes) Buccal surfaces of the premolars and the canines demonstrate worse lesions, as patients are likely to place the most brushing force on these surfaces. The lesions are progressively worse from the posterior to the anterior teeth. The damage does not progress beyond the gingival crest (instead of at the crest of the bone), which is where the theory suggests the flexure should be the worst. Not all persons with the lesions demonstrate occlusal wear and not all persons with severe occlusal wear exhibit NCCLs. Many cases show the absence of an antagonist to the affected tooth. If

the damage continues, or the damage begins after the extraction of the antagonist, then bruxing cannot be the cause." (6)

When diagnosing and searching for the best treatment options for cervical lesions it is absolutely essential to obtain a complete medical, dental, dietary, and social history along with a comprehensive examination from a medical and dental provider. Dental hygienists carry a responsibility to recognize the signs of cervical lesions, educate patients, refer them to the dentist for proper diagnosis and treatment and be educated on all treatment options in order to answer any questions that our patient may pose. Dental hygienists typically spend significantly more time with patients than the dentist does and therefore patients look to the dental hygienist to guide them in the proper direction regarding treatment for their dental health.

Chapter III

Methods and Materials

Introduction

The purpose of this study is to assess how dental hygienists are recognizing and educating patients on treatment options for cervical lesions. This study will collect data on how practicing registered dental hygienists assess cervical lesions; determine the etiology of the lesions and provide education for the specific treatment they would recommend (alongside their DDS/DMD). A consensus on how the majority of hygienists are viewing these conditions can determine if patients are indeed receiving the most accurate information and therefore further determine if in the future, any changes need to be made to our educational systems to better calibrate our dental hygienists.

Research Design

This research will be a descriptive survey in a case-study format. Registered dental hygienists from across America will receive an invitation to participate in an online survey through Survey Monkey via an online post on the lighthearted RDH Facebook page. This is a closed group which requires admittance from the page administrator who has verified through either each individuals dental hygiene school or license lookup to ensure all members are in fact registered dental hygienists. This will be done with written permission from the page administrator. Included will be a brief description of the survey and a link to access the survey. The survey should take approximately 5-10 minutes to complete. Participants will be given 2 weeks to complete

the survey. After the first week a reminder will be sent as to give individuals who have not yet participated a chance to do so.

There will be 3 case studies each containing different photos and scenarios but will consist of the same multiple-choice questions. Demographic information including the dental hygienists' education level, years of experience, and type of setting in which they work will be asked. Photos to be used in the case study were obtained from a private practice dental office with permission from the dentist/owner. Written consent has also been obtained from all patients whose photos have been taken and will be used.

Sample Defined

Participants will include registered dental hygienists who practice in various states throughout the country. Participants will be recruited through a closed dental hygiene social media page which means that one must request and have prior approval to be a member of such group. There are over 5,000 members in the social media group. Based upon the number of members who regularly post and/or participate in discussion in the group, the invitation is projected to be seen by over 1,000 registered dental hygienists. With a goal for response rate of 70%, approximately 700 dental hygienists are expected to participate. Participants will include registered dental hygienists who work in various settings including private practice, educational settings, and public health offices. They will have various educational backgrounds and different amounts of experience.

Data Collection and Analysis

All participants will remain anonymous and will receive a random participant number as their only identifier for means of data collection. Descriptive statistics will be analyzed

for each question. Analysis of how the majority of hygienists would assess a particular cervical lesion and how they would propose this lesion to be treated will be performed. Three similar case studies will be used to look for consistency vs. inconsistency of treatment between the three case studies. Assessment of the differences in proposed treatment in hygienists due to varying experience/educational backgrounds will be explored.

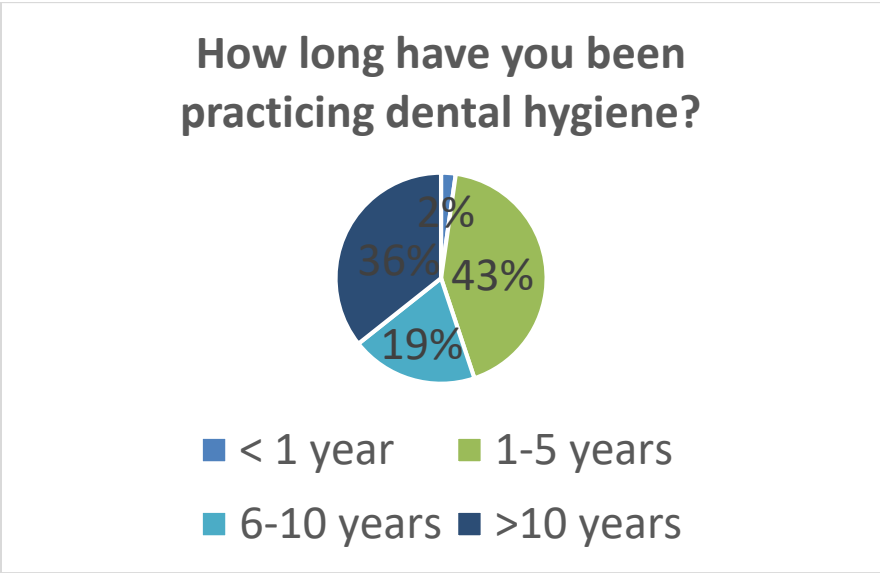
CHAPTER IV

RESULTS, DISCUSSION, AND CONCLUSION

Results

The survey invitation and link were posted to the social media site and a total of 401 individuals choose to participate. The survey was filtered for inconsistent and incomplete answers. This was done automatically by survey monkey which is where the survey was completed and was also done by the researcher. Results showed that all questions were answered in their entirety. Of those surveyed, the majority of dental hygienists, 42.64%, have been practicing for 1-5 years. The 10+ years group was right behind with 35.66%. A total of 19.45% have been practicing for 6-10 years and only 9 individuals, 2.24% have been practicing for under 1year.

Figure 1. How long have you been practicing dental hygiene?



Most work in a private practice, 87.78%, with the rest almost equally split between a public health setting, 6.48% or other type of setting, 5.74%. Just over half of those, 58.60% work on average 30-40 hours per week. While 23.44% work 20-30 hours per week, only 10.72% work part time under 20 hours and even less, 7.23% work over 40 hours per week.

Figure 2. In what type of dental setting do you practice?

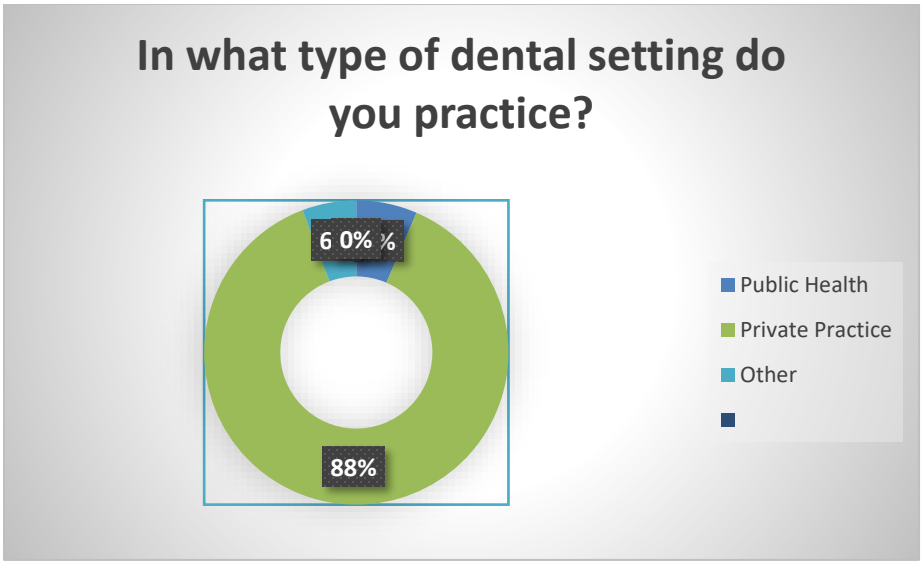
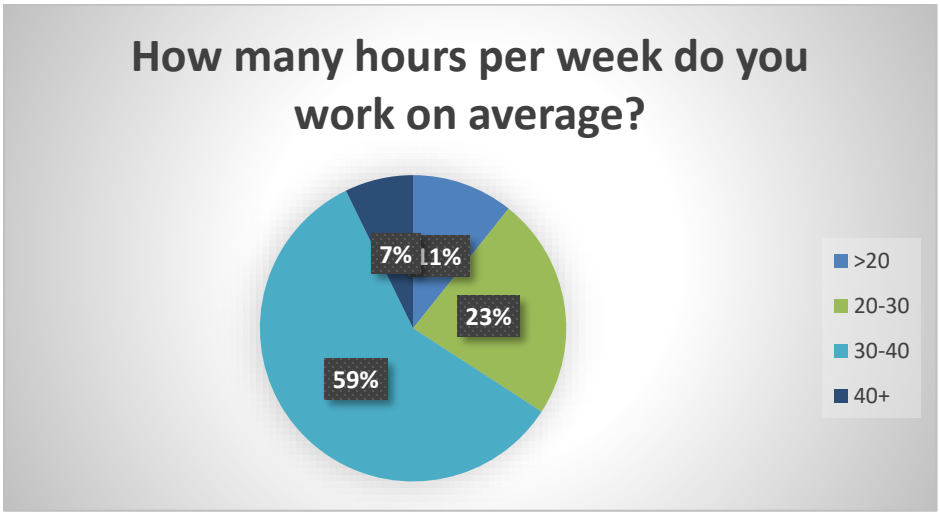
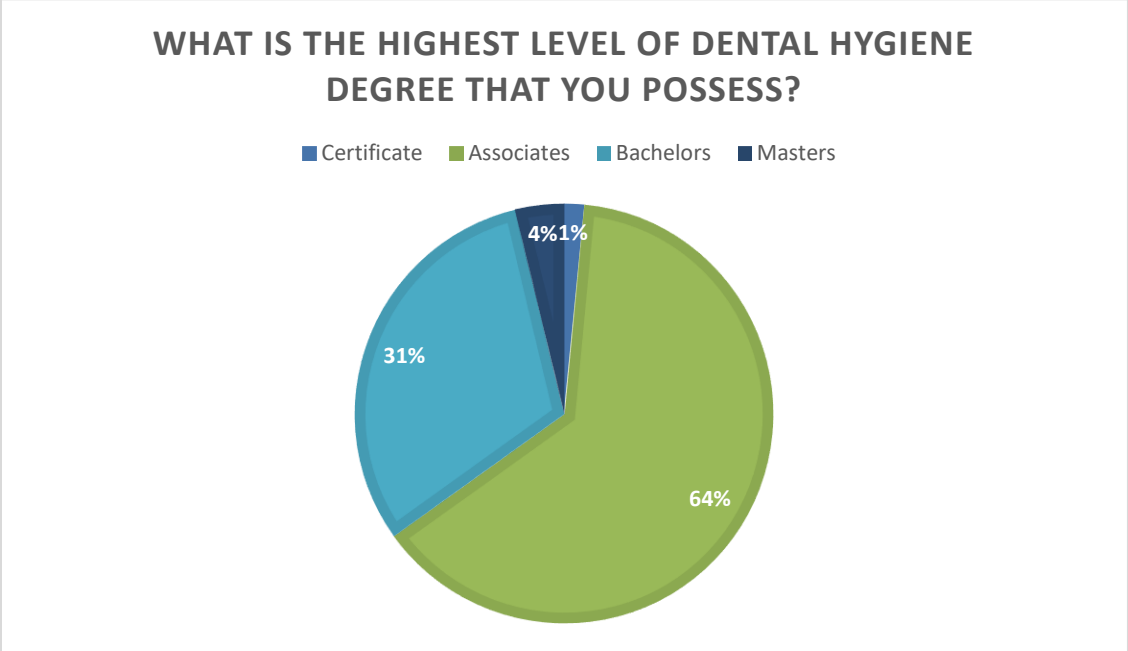


Figure 3. How many hours per week do you work on average?



Pertaining to the highest level of dental hygiene education obtained, over half have obtained an associate degree at 63.59%. Following were those with bachelorette degrees at 31.17%, while only 3.74% have obtained a master's degree and 6 of the 401 individuals or 1.50% have a certificate only.

Figure 4. What is the highest level of dental hygiene degree that you possess?



Results of each individual case study are as follows;

Case Study A

In the first case study 56.61% of individuals felt the lesion in question was an abfraction. Abrasion was not far behind with 36.14%, while 4.99% called it recession. Erosion and attrition were both about 1%, while only 1 person felt that it was none of the above.

Majority, 54.36%, felt that the cause was mechanical wear, 33.17% attributed it to grinding, and 12.47% said it was due to malocclusion. None felt that age was an attributing factor.

When it came to treatment options answers were more sporadic. Almost exactly half, 50.12% would recommend an occlusal guard, 47.63% would recommend a soft toothbrush, 35.66% felt that it needed a filling restoration, 11.47% would refer to orthodontics, and 8.73% felt that they would recommend a different treatment option other than what was listed.

Table 1. Survey questions and answers for case study A.

How would you identify the lesion in which the arrows are pointing to?	What would you say is the etiology for the lesion?	Which of the following treatment recommendations would you make?
Abfraction-56.61% (227)	Malocclusion-12.47% (50)	Orthodontics-11.47% (46)
Recession-4.99% (20)	Age- 0% (0)	Filling restoration-35.66% (143)
Erosion-1% (4)	Mechanical wear (ie. Toothbrush)- 54.36% (218)	Soft toothbrush-47.63% (191)
Abrasion-36.41% (146)	Grinding-33.17% (133)	Occlusal guard-50.12% (201)
Attrition-0.75% (3)		None of the above-8.73% (35)
None of the above-0.25% (1)		

Case Study B

For the second case study the vast majority of exactly 75% of individuals felt the lesion in question was recession. Abfraction followed with 15.25%, abrasion was 4.50% with attrition right behind with 3%. Only 1.75% or 7 individuals felt it to be erosion and only 2 individuals or 0.05% felt that it was none of the above.

Grinding as the main contributing factor came out on top with 33.25% while malocclusion and age were both almost equally, 24.18% and 24.94%, thought to be the main contributing factors. Only 17.63% attributed it to mechanical wear.

An occlusal guard was the most popular answer for treatment recommendations at 59.25%. Although only 17.63% attributed the lesion to mechanical wear, 39.25% recommended a soft tooth brush. 11% would have recommended orthodontics, 6.50% would have recommended a filling restoration and 14% would have recommended a different treatment option other than those listed.

Table 2. Survey questions and answers for case study B.

How would you identify the lesion in which the arrows are pointing to?	What would you say is the etiology for the lesion?	Which of the following treatment recommendations would you make?
Abfraction-15.25% (61)	Malocclusion-24.18% (96)	Orthodontics-11% (4)
Recession-75% (300)	Age-24.94% (99)	Filling restoration-6.5% (26)
Erosion-1.75% (7)	Mechanical wear (ie. Toothbrush)-17.63% (70)	Soft toothbrush-39.25% (157)
Abrasion-4.5% (18)	Grinding-33.25% (132)	Occlusal guard-59.25% (237)
Attrition-3% (12)		None of the above-14% (56)
None of the above-0.50% (2)		

Case Study C

On the final case study, answers were fairly close on naming the lesion in question with 41.35% naming it an abfraction and 37.59% naming it recession. There were 11.03% who called it abrasion. Attrition barely trailed at 8.02% and only 2.01% felt it to be erosion. Of the 401 participants there were none who choose none of the above.

The great majority of participants, 74.75%, attributed the lesion to grinding. Mechanical wear came in next at 15.50% with 8.50% attributing it to malocclusion and only 1.25% thought it to be age related.

Most individuals, 63.75%, would have recommended occlusal guard. A soft tooth brush trailed as the second most popular recommendation at 16.75%. A filling restoration came in third at 8%, 6.50% would have chosen orthodontics as the best treatment and 20 individuals or 5% would have chosen none of the above.

Table 3. Survey questions and answers for case study C.

How would you identify the lesion in which the arrows are pointing to?	What would you say is the etiology for the lesion?	Which of the following treatment recommendations would you make?
Abfraction-41.35% (165)	Malocclusion-8.5% (34)	Orthodontics-6.5% (26)
Recession-37.56% (150)	Age-1.25% (5)	Filling restoration-8% (32)
Erosion-2.01% (8)	Mechanical wear (ie. Toothbrush)-15.50% (62)	Soft toothbrush-16.75% (67)
Abrasion-11.03% (44)	Grinding-74.75% (299)	Occlusal guard-63.75% (255)
Attrition-8.02% (32)		None of the above-5% (20)
None of the above-0% (0)		

Figure 5. How would you identify the lesion in which the arrows are pointing to? Answers for case studies A, B, C.

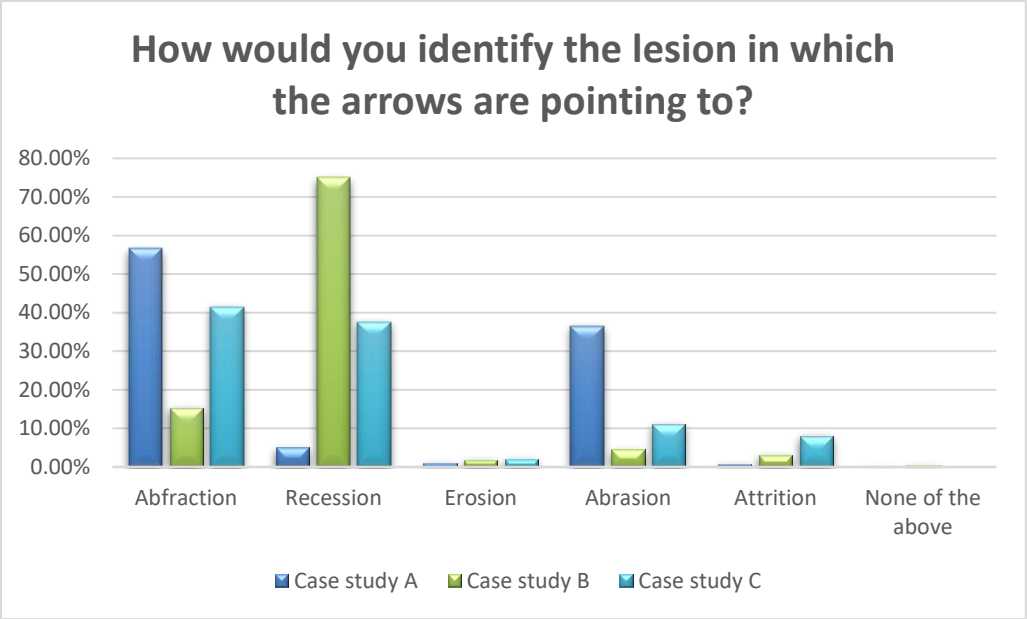


Figure 6. What would you say is the etiology of the lesion? Answers for case studies A, B, C.

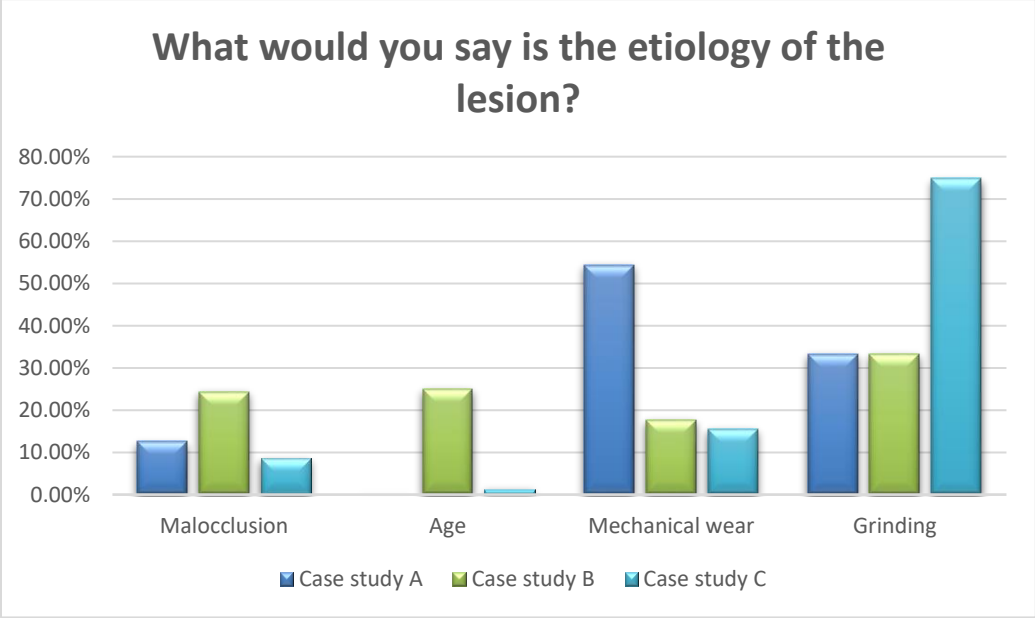
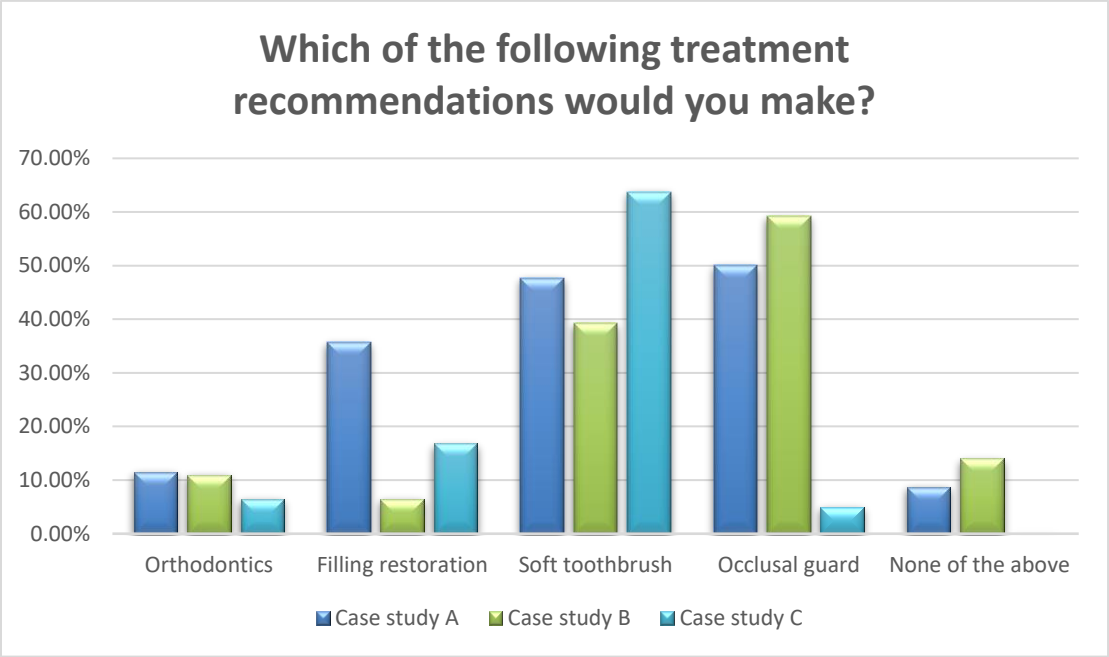


Figure 7. Which of the following treatment recommendations would you make? Answers for case studies A, B, C.



Discussion

Case study A showed some calibration between dental hygienists as over half of participants felt the lesion in question to be an abfraction caused by mechanical wear. However, when it came to treatment recommendations there was no clear majority on the best type of treatment option. Case study B was very clear with 75% of participants believing the lesion in question to be recession. Over half agreed that an occlusal guard was the best recommendation for this patient even though no one really agreed on how this said recession was caused as all answers for the etiology were really close to equal. When it came to the final case study C, about 75% believed the lesion was caused by grinding and most would have recommended an occlusal guard. As far as naming this lesion, abfraction and recession were the two top contenders right around 40% for each.

Variations in answers may have come from the case study set up itself. If no background information was given and the participant was only shown a picture, one could question if the answers would have still remained the same. This was thought of beforehand however, in a real-life scenario in a dental practice setting, dental hygienists are not just shown a picture. Dental hygienists typically have the patient in front of them where they have the luxury of discussing these topics with the patient directly in order to get some background information to be able to make a more informed decision on the types of lesions presenting themselves, their causes, and the best treatment.

Conclusion

Overall dental hygienists are not as calibrated with one another as was hoped on the topic of dental cervical lesions. This leads into wondering if these discrepancies are more evident right out of dental hygiene school or if it is not until after a dental hygienist has been working in a specific type of dental setting for an amount of time. This could be an influence because someone who works in an orthodontic office may be more inclined to side with orthodontics as the best treatment option. In another area of the spectrum, one who works in a low-income type of setting may tend to side with making recommendations based solely on what insurance companies typically cover. Maybe years of experience plays a role as someone who has worked longer has seen more and has learned what works and what doesn't. However, even though a dental hygienist may have worked for over 20 years, what if he or she only works an average of 1 day per week where another dental hygienist has only worked for 5 years but works an average of 6 days a week. Now who is to say which one is more experienced? The purpose of this study was solely to test if dental hygienists were calibrated on the subject matter of dental

cervical lesion. Further investigation is now being done to further break down these numbers to test and see if type of work setting, years of experience, and education levels have anything to do with the discrepancies in this study. This information is not included in this original study as the hypothesis was originally testing to find if there is calibration between dental hygienist on the subject matter. If the hypothesis had shown that yes, the majority of dental hygienists are calibrated on the topic of dental cervical lesions then no further investigation would have been needed.

It is important for dental hygienists to be calibrated in not only this topic but in all subject matters because dental hygienists must always work to provide the best information for patients. Dental cervical lesions as a topic still has a lot of holes and grey area in the subject matter. It is important for dental hygienists to provide factual and evidence-based information to their patients and this study was designed in order to get a better idea of what areas need to be further investigated.

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Chapter V

Article for submission

Title:

Hygienists & Dental Cervical Lesions

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Keywords: Dental cervical lesions, Dental hygiene, Attrition, Abrasion, Erosion, Abfraction

Abstract:

Objectives: The purpose of this study was to assess how dental hygienists are recognizing and educating patients on treatment options for dental cervical lesions. This was done in order to examine whether or not dental hygienists throughout the country are calibrated on their assessment and treatment recommendations of dental cervical lesions. It was also designed as a baseline for further examination of whether or not education, experience, and working environment have any influence in making these assessments.

Methods: A descriptive survey was sent out to practicing dental hygienists via a closed social media group. The survey included questions pertaining to work environment, experience, and education levels. The survey also included 3 case studies with pictures where the participants had to identify a specific dental cervical lesion, assess the cause of it, and choose a recommended treatment option. Descriptive statistics were used for all inquiries.

Results: A total of 401 surveys were completed and analyzed. Descriptive analysis identified no concrete calibration amongst dental hygienists pertaining to dental cervical lesions.

Conclusion: Dental hygienists throughout the country are not calibrated on the subject of dental cervical lesions. More correlation needs to be improved across the board.

Clinical Relevance:

Scientific Rational for the study:

With more research coming out linking together the effect that one's oral health has on overall health it is important for dental hygienists to be calibrated on how they practice and the information that they are giving to patients. A patient should receive the same recommendation of treatment regardless of what dental office they go to.

Principal findings:

Dental hygienists were not calibrated on the subject of dental cervical lesions.

Practical implications:

Further investigation into the results received is being conducted in order to examine what exactly it is that makes these discrepancies in this subject matter whether it be working experience, education levels, or working environments.

Introduction:

Many dental providers will agree that tooth sensitivity is one of the most common chief complaints of patients. Between 8-57% of patients will report that they regularly experience tooth sensitivity. (1,2) The wide range could be related to different methods used to diagnose this condition and whether prevalence was assessed by clinical examination and/or questionnaires. (1) Tooth sensitivity is often attributed to exposed dentin and there are various reasons to explain why this occurs, including toothbrush abrasion, erosion, attrition, or abfraction lesions. Depending on the etiology of the lesion there are various treatment options that can be recommended. In order to provide the correct assessment and treatment recommendation, a comprehensive medical and dental history should be conducted as well as a comprehensive dental exam that includes evaluation of the temporomandibular joint (TMJ), oral cancer screening (OCS), occlusion, intraoral photos, periodontal evaluation, and hard and soft tissue charting. Unfortunately, not all of these steps are followed when it comes to seeking the etiology of these lesions and many times recommendations are made solely on which type of treatment the dental provider most often prefers to perform. Exploring all of these types of cervical lesions, their etiologies, and treatment options is critical to providing proper treatment to each patient.

According to the Bureau of Labor Statistics, between the years of 2014 to 2024 the number of registered dental hygienists is expected to grow by approximately 19% which is significantly higher than average (3). Dental hygienists spend the majority of time with patients during periodic recall visits. Working in such close proximities with patients, so much trust is gained between patient and provider and many times patients

rely on the dental hygienist for guidance when it comes to making the best decision about the dentists' recommended treatment plan. As a member of a healthcare team, it is imperative that dental hygienists strive to provide the best care to patients. With any healthcare career it is important for healthcare professionals to be consistent and calibrated in their diagnosis, patient education, and treatment recommendations. In dental hygiene, this is regulated though accredited dental hygiene schools' curriculum and again through national, regional, and state board examinations. With so many different treatment options it is many times overwhelming for a patient to be confident in making the correct decision pertaining to their own dental health.

As a dental hygienist, it is important to recognize cervical lesions and educate patients as many times some patients do not even know they exist. Often times dental hygienists are asked by their dentists to have the conversation with a patient when they recognize a problem area, educate the patient of the problem, and discuss possible treatment options. The dentist then will confirm and officially diagnose the issue and recommend treatment. With so much trust and responsibility, from patients as well as their dentists, dental hygienists need to be confident in recommending the best treatment to patients and calibration and consistency are key to making sure that the patient would receive the same recommendation no matter which dental office they went to. This study evaluated how dental hygienists' recognize, assess, and provide education on the treatment options for cervical lesions in order to gauge the calibration of dental hygienists on this subject matter.

Study Population and Methodology:

The sample consisted of registered dental hygienists who are licensed and practice in all areas of the United States. These participants worked in various settings including private practice, educational settings, and public health offices. They had various educational backgrounds and different amounts of experience.

A descriptive survey in a case-study format was sent out over social media in a closed Facebook page via a clickable weblink to the survey. The group requires admittance from the page administrator who has verified through either each individuals' dental hygiene school or license lookup to ensure all members are in fact registered dental hygienists. This was done with written permission from the page administrator. Included was the website link to the survey, an approved copy of the informed consent, a brief description of the survey, and contact information. Participants were given 2 weeks to complete the survey. After the first week a reminder was sent as to give individuals who have not yet participated a chance to do so.

The survey consisted of 3 case studies each containing different photos and scenarios but contained the same multiple-choice questions. Demographic information including the dental hygienists' education level, years of experience, and type of setting in which they work was asked. Photos to be used in the case study were obtained from a private practice dental office with permission from the dentist/owner. Written consent was also obtained from all patients whose photos have been taken and were used.

Results:

A total of 401 individuals participated in the survey. The survey was filtered for inconsistent and incomplete answers. Results showed that all questions were answered in their entirety. Descriptive statistics were used to analyze all answers.

Data revealed that the largest group of dental hygienists, 42.64%, have been practicing for 1-5 years. The 10+ years group was right behind with 35.66%. A total of 19.45% have been practicing for 6-10 years and only 9 individuals, 2.24% have been practicing for under 1year. Most work in a private practice, 87.78%, with the rest almost equally split between a public health setting, 6.48% or other type of setting, 5.74%. Just over half of those, 58.60% work on average 30-40 hours per week. While 23.44% work 20-30 hours per week, only 10.72% work part time under 20 hours and even less, 7.23% work over 40 hours per week. Pertaining to the highest level of dental hygiene education obtained, over half have obtained an associate degree at 63.59%. Following were those with bachelorette degrees at 31.17%, while only 3.74% have obtained a master's degree and 6 of the 401 individuals or 1.50% have a certificate only.

Figure 1. How long have you been practicing dental hygiene?

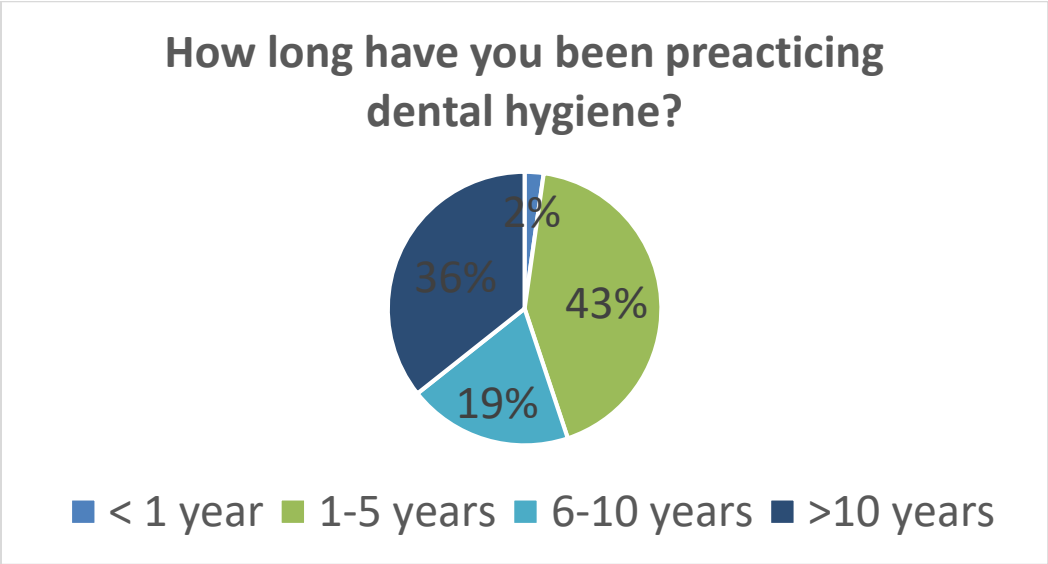


Figure 2. In what type of dental setting do you practice?

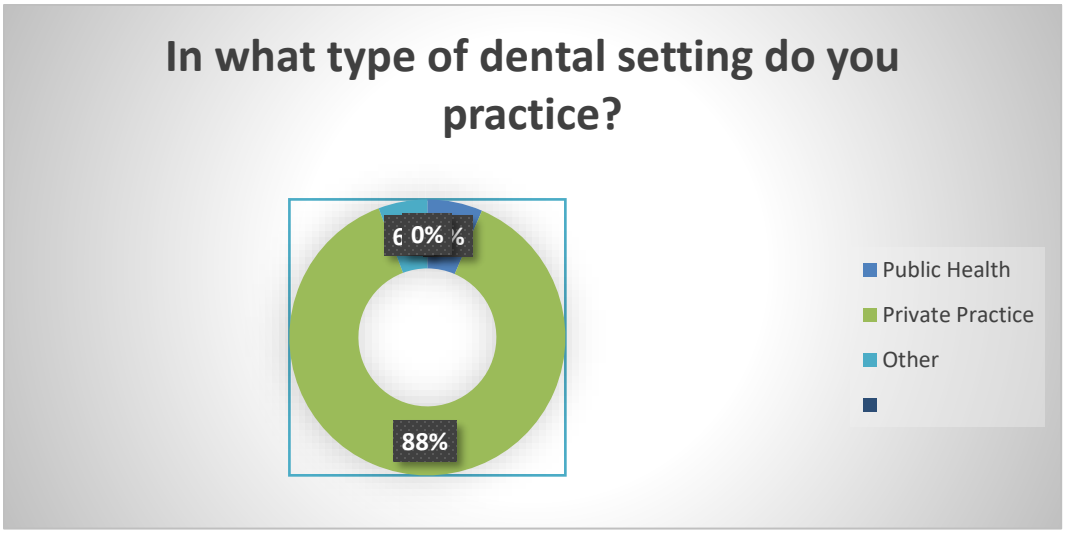


Figure 3. How many hours per week do you work on average?

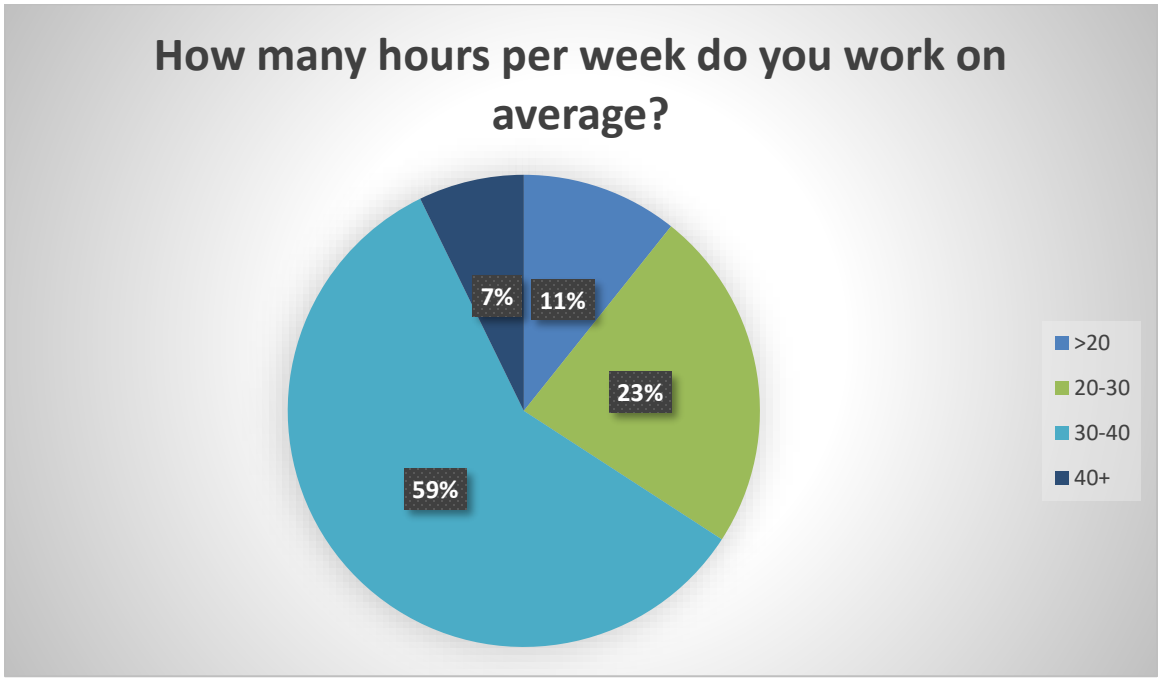
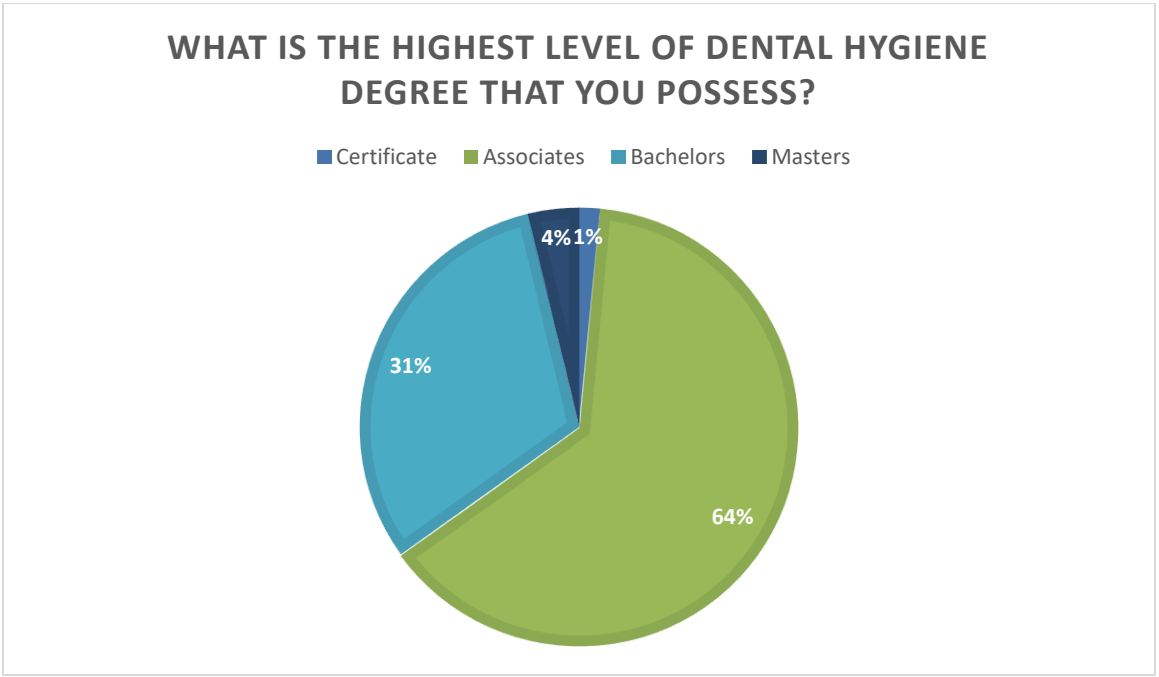


Figure 4. What is the highest level of dental hygiene degree that you possess?



Case Study A:

Figure 5. Cervical lesion Case Study A

In the first case study 56.61% of individuals felt the lesion in question was an abfraction. Abrasion was not far behind with 36.14%, while 4.99% called it recession. Erosion and attrition were both about 1%, while only 1 person felt that it was none of the above.

Majority, 54.36%, felt that the cause was mechanical wear, 33.17% attributed it to grinding, and 12.47% said it was due to malocclusion. None felt that age was an attributing factor.

When it came to treatment options answers were more sporadic. Almost exactly half, 50.12% would recommend an occlusal guard, 47.63% would recommend a soft toothbrush, 35.66% felt that it needed a filling restoration, 11.47% would refer to orthodontics, and 8.73% felt that they would recommend a different treatment option other than what was listed.

Table 1. Survey questions and answers for case study A.

How would you identify the lesion in which the arrows are pointing to?	What would you say is the etiology for the lesion?	Which of the following treatment recommendations would you make?
Abfraction-56.61% (227)	Malocclusion-12.47% (50)	Orthodontics-11.47% (46)
Recession-4.99% (20)	Age- 0% (0)	Filling restoration-35.66% (143)
Erosion-1% (4)	Mechanical wear (ie. Toothbrush)- 54.36% (218)	Soft toothbrush-47.63% (191)
Abrasion-36.41% (146)	Grinding-33.17% (133)	Occlusal guard-50.12% (201)
Attrition-0.75% (3)		None of the above-8.73% (35)
None of the above-0.25% (1)		

Case Study B:

Figure 6. Cervical Lesion for Case Study B

For the second case study the vast majority of exactly 75% of individuals felt the lesion in question was recession. Abfraction followed with 15.25%, abrasion was 4.50% with attrition right behind with 3%. Only 1.75% or 7 individuals felt it to be erosion and only 2 individuals or 0.05% felt that it was none of the above.

Grinding as the main contributing factor came out on top with 33.25% while malocclusion and age were both almost equally, 24.18% and 24.94%, thought to be the main contributing factors. Only 17.63% attributed it to mechanical wear.

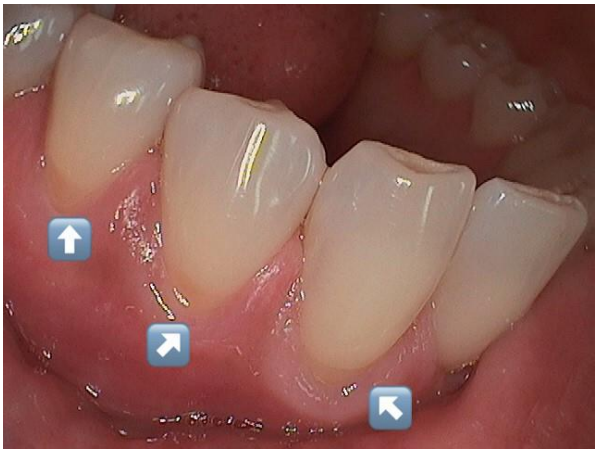
An occlusal guard was the most popular answer for treatment recommendations at 59.25%. Although only 17.63% attributed the lesion to mechanical wear, 39.25% recommended a soft tooth brush. 11% would have recommended orthodontics, 6.50% would have recommended a filling restoration and 14% would have recommended a different treatment option other than those listed.

Table 2. Survey questions and answers for case study B.

How would you identify the lesion in which the arrows are pointing to?	What would you say is the etiology for the lesion?	Which of the following treatment recommendations would you make?
Abfraction-15.25% (61)	Malocclusion-24.18% (96)	Orthodontics-11% (4)
Recession-75% (300)	Age-24.94% (99)	Filling restoration-6.5% (26)
Erosion-1.75% (7)	Mechanical wear (ie. Toothbrush)-17.63% (70)	Soft toothbrush-39.25% (157)
Abrasion-4.5% (18)	Grinding-33.25% (132)	Occlusal guard-59.25% (237)
Attrition-3% (12)		None of the above-14% (56)
None of the above-0.50% (2)		

Case Study C:

Figure 7. Cervical Lesion for Case Study C.



On the final case study, answers were fairly close on naming the lesion in question with 41.35% naming it an abfraction and 37.59% naming it recession. There were 11.03% who called it abrasion. Attrition barely trailed at 8.02% and only 2.01% felt it to be erosion. Of the 401 participants there were none who choose none of the above.

The great majority of participants, 74.75%, attributed the lesion to grinding. Mechanical wear came in next at 15.50% with 8.50% attributing it to malocclusion and only 1.25% thought it to be age related.

Most individuals, 63.75%, would have recommended occlusal guard. A soft tooth brush trailed as the second most popular recommendation at 16.75%. A filling restoration came in third at 8%, 6.50% would have chosen orthodontics as the best treatment and 20 individuals or 5% would have chosen none of the above.

Table 3. Survey questions and answers for case study C.

How would you identify the lesion in which the arrows are pointing to?	What would you say is the etiology for the lesion?	Which of the following treatment recommendations would you make?
Abfraction-41.35% (165)	Malocclusion-8.5% (34)	Orthodontics-6.5% (26)
Recession-37.56% (150)	Age-1.25% (5)	Filling restoration-8% (32)
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Attrition-8.02% (32)		None of the above-5% (20)
None of the above-0% (0)		

Discussion

Case study A showed some calibration between dental hygienists as over half of participants felt the lesion in question to be an abfraction caused by mechanical wear. However, when it came to treatment recommendations there was no clear majority on the best type of treatment option. Case study B was very clear with 75% of participants believing the lesion in question to be recession. Over half agreed that an occlusal guard was the best recommendation for this patient even though no one really agreed on how this said recession was caused as all answers for the etiology were really close to equal. When it came to the final case study C, about 75% believed the lesion was caused by grinding and most would have recommended an occlusal guard. As far as naming this lesion, abfraction and recession were the two top contenders right around 40% for each. Variations in answers may have come from the case study set up itself. If no background information was given and the participant was only shown a picture, one could question if the answers would have still remained the same. This was thought of beforehand however, in a real-life scenario in a dental practice setting, dental hygienists are not just shown a picture. Dental hygienists typically have the patient in front of them where they have the luxury of discussing these topics with the patient directly in order to get some background information to be able to make a more informed decision on the types of lesions presenting themselves, their causes, and the best treatment.

This study demonstrated that overall dental hygienists are not uniformly calibrated on the topic of dental cervical lesions. This leads into wondering if these discrepancies are more evident right out of dental hygiene school or if it is not until after a dental hygienist has been working in a specific type of dental setting for an amount of

time. This could be an influence because someone who works in an orthodontic office may be more inclined to side with orthodontics as the best treatment option. In another area of the spectrum, one who works in a low-income type of setting may tend to side with making recommendations based solely on what insurance companies typically cover. Years of experience can possibly play a role as someone who has worked longer has seen more and has learned what works and what doesn't. However, even though a dental hygienist may have worked for over 20 years, what if he or she only works an average of 1 day per week where another dental hygienist has only worked for 5 years but works an average of 6 days a week. Now who is to say which one is more experienced? The purpose of this study was solely to test if dental hygienists were calibrated on the subject matter of dental cervical lesion. Future studies would further break down these numbers to test and see if type of work setting, years of experience, and education levels have anything to do with the discrepancies in this study. It is important for dental hygienists to be calibrated in not only this topic but all around because dental hygienists must always work to provide the best information for patients. Dental cervical lesions as a specific topic entity still has a lot of holes and grey area in the subject matter. It is important for dental hygienists to provide factual and evidence-based information to their patients and this study was designed in order to get a better idea of what areas need to be further investigated.

Figure 8. How would you identify the lesion in which the arrows are pointing to? Answers for case studies A, B, C.

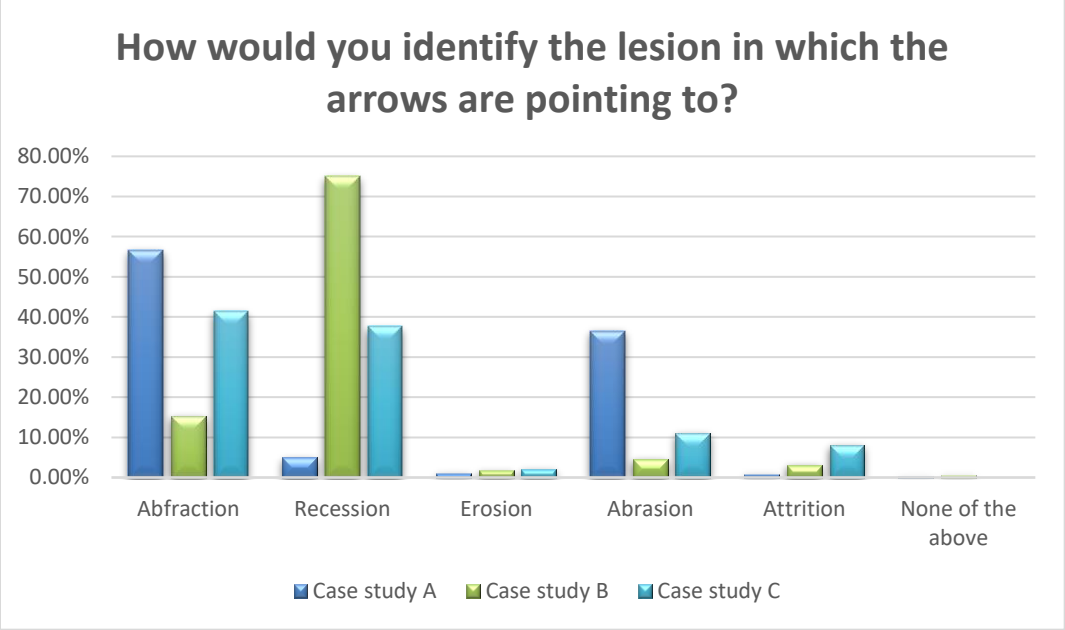


Figure 9. What would you say is the etiology of the lesion? Answers for case studies A, B, C.

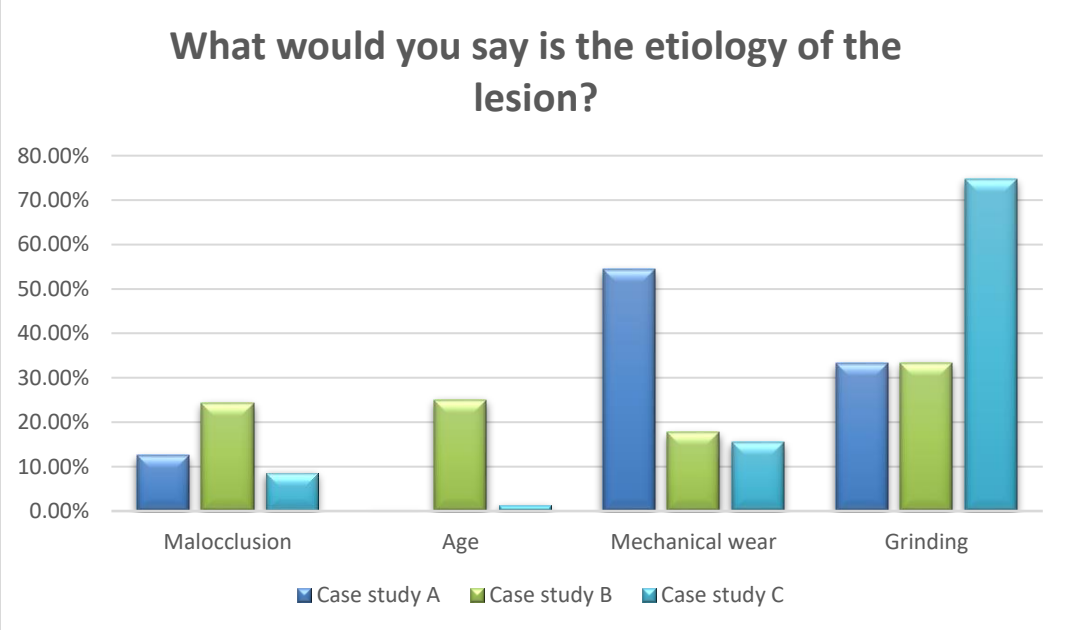
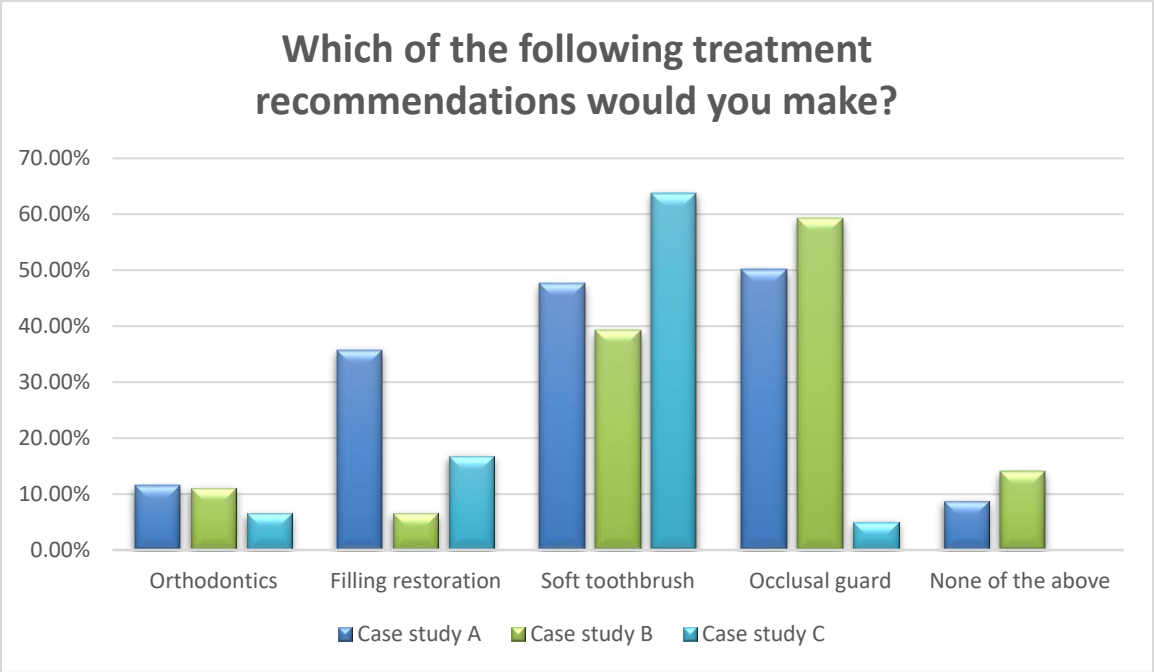


Figure 10. Which of the following treatment recommendations would you make? Answers for case studies A, B, C.



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2. Kaidonis, John A. "Tooth wear: the view of the anthropologist." *Clinical Oral Investigations* (2008): 21-26.

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APPENDIX A: HRRC APPROVAL LETTER

UNM HEALTH SCIENCES CENTER

Human Research Review Committee
Human Research Protections Office

December 19, 2017

Christine Nathe
University of New Mexico
MSC09 5020
Albuquerque, NM 87131
(505) 272-8147
Fax: (505) 272-5584
CNathe@salud.unm.edu

Dear Christine Nathe:

On 12/19/2017, the HRRC reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Dental hygienists clinical assessment of cervical lesions
Investigator:	Christine Nathe
Study ID:	17-431
Submission ID:	17-431
IND, IDE, or HDE:	None
Submission Summary:	Initial Study
Documents Approved:	• Cervical lesion survey • Cervical lesion protocol • Cervical Lesions-Facebook Script • Cervical lesion survey consent
Review Category:	EXEMPTION: Categories (2) Tests, surveys, interviews, or observation.
Determinations/Waivers:	Provisions for consent are adequate. HIPAA is not applicable.
Submission Approval Date:	12/19/2017
Approval End Date:	None
Effective Date:	**12/19/2017**

The HRRC approved the study from 12/19/2017 to inclusive. If modifications were required to secure approval, the effective date will be later than the approval date. The "Effective Date" 12/19/2017 is the date the HRRC approved your modifications and, in all cases, represents the date study activities may begin.

Because it has been granted exemption, this research is not subject to continuing review.

Please use the consent documents that were approved and stamped by the HRRC. The stamped and approved consents are available for your retrieval in the "Documents" tab of the parent study.

This determination applies only to the activities described in this submission and does not apply should you make any changes to these documents. If changes are being considered and there are questions about whether HRRC review is needed, please submit a study modification to the HRRC for a determination. A change in the research may disqualify this research from the current review category. You can create a modification by clicking Create Modification / CR within the study.

In conducting this study, you are required to follow the Investigator Manual dated April 1, 2015 (HRP-103), which can be found by navigating to the IRB Library.

Sincerely,

Thomas F. Byrd, MD
HRRC Chair

APPENDIX B: STUDY SURVEY

Study Survey

1. How long have you been practicing dental hygiene?
    a. <1 year b. 1-5 years c. 6-10 years d. >10years
2. In what type of dental setting do you practice?
    a. Public health b. Private practice c. Other
3. What is the highest level of dental hygiene degree that you possess?
    a. Certificate b. Associates c. Bachelors d. Masters
4. How many hours per week do you work on average?
    a. >20 b. 20-30 c. 30-40 d. 40+

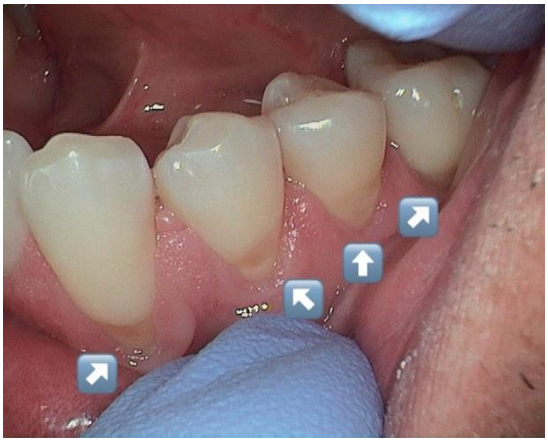
Case Study A:

41yr old Male

HH: No significant findings

DH: Brushes 1-2x/day. Recently switched from a soft manual toothbrush to a Sonicare 3 months ago.

Patient feels that he was previously a very aggressive brusher in the past but feels the he no longer brushes aggressively especially since switching to an electric toothbrush.



5. Referring to case study A. How would you identify the lesion?
    a. Abfraction b. Recession c. Erosion d. Abrasion e. Attrition d. None of the above
6. Referring to case study A. What would you say is the etiology for the lesion?
    a. Malocclusion b. Age c. Toothbrush abrasion d. Grinding

7. Referring to case study A. Which of the following treatment recommendations would you make?
    a. Orthodontics b. Filling restoration c. Soft toothbrush d. Occlusal guard e. None of the above

Case Study B:

78yr old male

HH: No significant findings

DH: Brushes 2x/day with electric toothbrush. Uses water pick 1x/day

Patient has experienced popping and locking of the TMJ since he could remember. Does not use any sort of oral appliance for TMJ issues

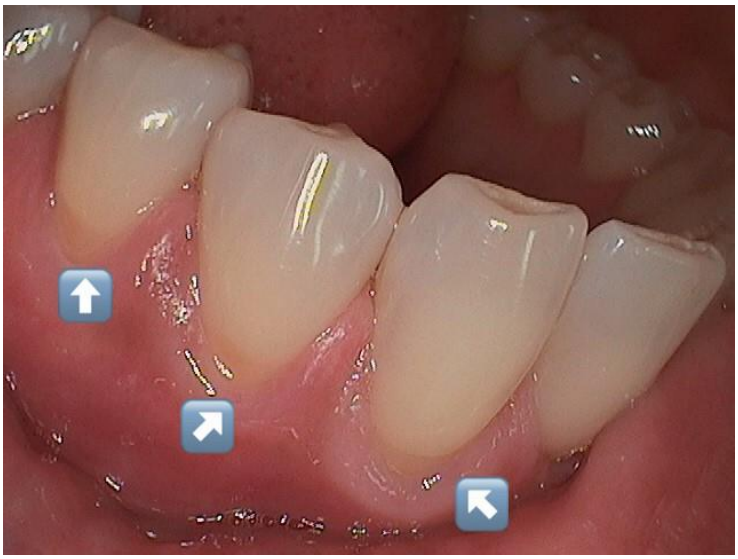
8. Referring to case study B. How would you identify the lesion?
    a. Abfraction b. Recession c. Erosion d. Abrasion e. Attrition d. None of the above
9. Referring to case study B. What would you say is the etiology for the lesion?
    a. Malocclusion b. Age c. Toothbrush abrasion d. Grinding
10. Referring to case study B. Which of the following treatment recommendations would you make?
    a. Orthodontics b. Filling restoration c. Soft toothbrush d. Occlusal guard e. None of the above

Case Study C:

58yr old Female

HH: No significant findings

DH: Brushes 1-2x/day with manual tooth brush. Is aware that she clenches and grinds her teeth. Has a night guard but does not always wear it. Has generalized moderate tooth sensitivity.



11. Referring to case study C. How would you identify the lesion?
    a. Abfraction b. Recession c. Erosion d. Abrasion e. Attrition d. None of the above
12. Referring to case study C. What would you say is the etiology for the lesion?
    a. Malocclusion b. Age c. Toothbrush abrasion d. Grinding
13. Referring to case study C. Which of the following treatment recommendations would you make?
    a. Orthodontics b. Filling restoration c. Soft toothbrush d. Occlusal guard e. None of the above

APPENDIX C: RECRUITMENT LETTER

My name is Shyanne Padilla and I am a graduate student at the University of New Mexico. As part of my degree requirements I am inviting you to please help me complete my thesis by participating in a quick online survey which pertains directly to our field of work. The survey focuses on cervical lesions and is designed in a case study format. All questions are multiple choice and the entire survey should only take approximately 5-10 minutes to complete. All participants will remain completely anonymous. Just click on the link below to access the survey which will be available for the next 2 weeks. Thank you for your time.

(Web link will be inserted here)

APPENDIX D: CONSENT FORM

University of New Mexico Health Sciences Center
Informed Consent Cover Letter for Anonymous Surveys

STUDY TITLE
Dental hygienists clinical assessment of cervical lesions

Mrs. Christine Nathe M.S. from the Department of Dental Medicine, Division of Dental Hygiene, is conducting a research study. The purpose of the study is assess how clinical dental hygienists evaluate cervical lesions.. You are being asked to participate in this study because you are a registered dental hygienist.

Your participation will involve an annonymous survey seeking information on how you would assess and address cervical lesions. The survey should take about 5-10 minutes to complete. Your involvement in the study is voluntary, and you may choose not to participate. There are no names or identifying information associated with this survey. The survey includes questions such as case studies asking you to idenitfy conditions contributing to cervical lesions and treatment recommedations.. You can refuse to answer any of the questions at any time. There are no known risks in this study, but some individuals may experience discomfort when answering questions. All data will be kept for 1 year in a locked file in Mrs. Christine Nathe's office and then destroyed.

The findings from this project will provide information on dental hygienists calibration in relation to cervical lesions. If published, results will be presented in summary form only.

If you have any questions about this research project, please feel free to call Shyanne Padilla MS Candidate at (505)977-7805. If you have questions regarding your legal rights as a research subject, you may call the UNMHSC Office of Human Research Protections at (505) 272-1129.

By completing this survey you will be agreeing to participate in the above described research study.

Thank you for your consideration.

Sincerely,

Researcher's Name
Christine Nathe RDH, MS
Researcher's Title
Professor and Program Director

HRRC#
Version Date

HRPO #: Page 1 of 1 Version: