

# BEYOND PERCEPTION

Vol. 3, Iss. 1



## SPRING NEWSLETTER 2024

*The Lydia Lopez Research Group*

Portal to Odontology by  
Dr. José M. Saldaña



To Dr. Lydia Lopez:

We are honored to announce the renaming of our chapter to "The Lydia Lopez Research Group" in recognition of Dr. Lydia Lopez's invaluable contributions to our student association and the School of Dental Medicine at the University of Puerto Rico.

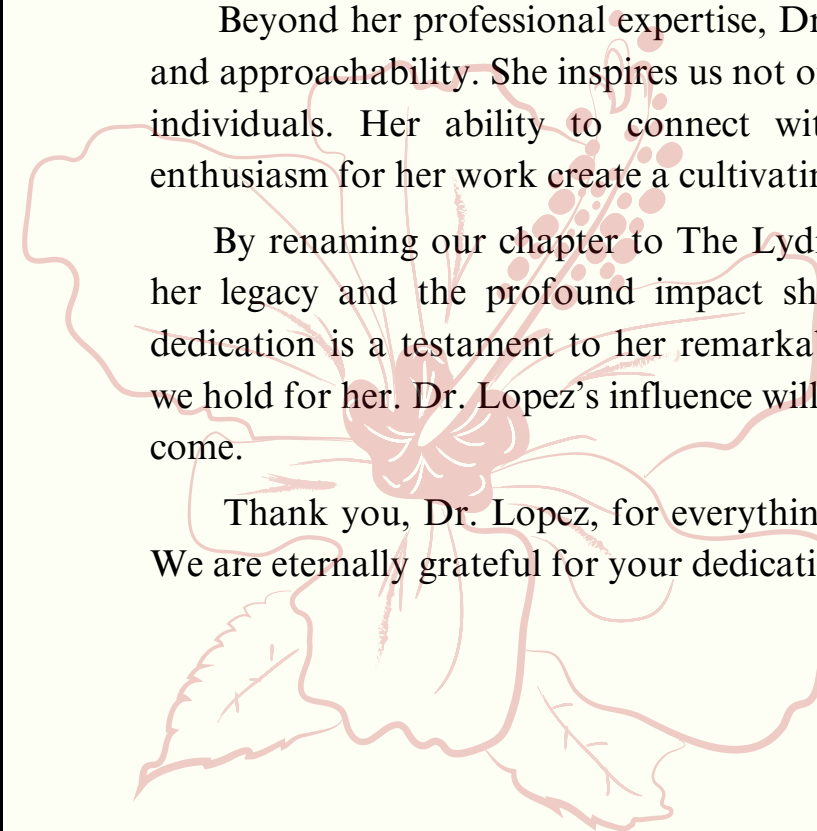
Dr. Lydia Lopez has been an important part of our community. Her support, tireless dedication, and genuine care for each student have profoundly impacted our academic and personal growth. Originating from Cuba, Dr. Lopez moved to Puerto Rico many years ago and has since become an integral part of our school. Her presence has been one of the best things that has happened to us.

Dr. Lopez's passion for mentoring and her commitment to excellence are evident in every aspect of her work. She is always there for us, willing to assist with anything we ask of her, and often going above and beyond to ensure our success. Her guidance has been instrumental in numerous research projects, helping us achieve milestones we once thought unreachable.

Beyond her professional expertise, Dr. Lopez is known for her warmth, kindness, and approachability. She inspires us not only to be better students but also to be better individuals. Her ability to connect with students on a personal level and her enthusiasm for her work create a cultivating and motivating environment.

By renaming our chapter to The Lydia Lopez Research Group, we aim to honor her legacy and the profound impact she has had on our lives and chapter. This dedication is a testament to her remarkable contributions and the deep appreciation we hold for her. Dr. Lopez's influence will continue to guide and inspire us for years to come.

Thank you, Dr. Lopez, for everything you have done and continue to do for us. We are eternally grateful for your dedication and love for our student chapter.





# Letter from the President



President:  
Joseluis Torres, DS III

Dear readers,

This year marks a series of significant **firsts** for us, starting with our new name, “The Lydia Lopez Research Group”, and it is with immense pride and excitement that I present to you our **first** ever: 2024 Spring Newsletter. With our association's new name, we start this journey with excitement and our commitment to excellence. In this edition, we exceed previous milestones, delivering a newsletter that is more enriched than ever before.

As many of you may recall, our previous publication, “Beyond Perception 2023 Newsletter”, achieved the remarkable distinction of being awarded the "Best Local Student Research Group Award" at the prestigious AADOCR National Student Research Group (NSRG) Awards Ceremony, held in New Orleans, Louisiana. The pride I feel for my team of editors, writers, and researchers knows no bounds, and this being the **first** time for our school, the atmosphere of achievement within our faculty and peers is palpable.

Building on the success of our last newsletter, which featured 8 remarkable research pieces, we are thrilled to present 19 diverse and compelling articles in this edition. We have organized the content into specialized sections, covering a wide range of topics from general dentistry to orthodontics, pediatric dentistry, prosthodontics, endodontics, and periodontics.

Moreover, in a desire to foster interdisciplinary collaboration, we have introduced a new section, for the **first** time, titled "Interdisciplinary Section." Here, three students from various fields—medicine, public health, and pharmacy—share their perspectives on how their specialties intersect with dental medicine. It's an exciting mix of ideas and expertise from different academic disciplines, and we anticipate it will enrich our readers' understanding of the broader healthcare landscape.

As we continue to push the boundaries of dental research and education, I extend my deepest gratitude to our contributors, readers, and supporters who make our newsletter possible. Together, we are shaping the future of dentistry and advancing our collective knowledge for the better of patient care.

Thank you for joining us on this journey.

Warm regards,

Joseluis E. Torres Colón  
The Lydia Lopez Research Group, President

# Editors Note



Newsletter Coordinator:  
Adrian N. Suarez Torres, DS III

To those reading our magazine,

Welcome to our first edition of the "2024 Spring Dental Magazine"! We are excited to present this carefully crafted compilation of articles and research papers, truly reflecting the inventive spirit and commitment of our team.

This issue marks a series of important milestones for our newly named "The Lydia Lopez Research Group". As our President, Joseluis Torres, pointed out in his letter, our journey has been punctuated by significant accomplishments, most notably our recognition at the AADOCR National Student Research Group Awards Ceremony. This award not only recognizes our previous publication, "Beyond Perception 2023 Newsletter", but also sets a high standard for this and future editions

Our magazine comprises diverse and captivating articles, touching on the broad spectrum that the dental specialties encompass. From general dentistry through orthodontics, pediatric dentistry, prosthodontics, endodontics, and periodontics, we aim to touch all aspects of our field. Each section is tailored to provide our readers with valuable insight and the latest developments in their craft.

We wish to extend our sincere gratitude to our contributors for their dedication and expertise, which have made this magazine possible. Their hard work makes sure we continue to push the boundary lines of dental research and education. We would also like to extend our heartfelt gratitude to our readers and supporters for their undying commitment to pushing the boundaries of the dental field.

We hope that as you read through the pages of our maiden edition, the "2024 Spring Dental Magazine", you will find inspiration, knowledge, and a revitalized passion for dental research and patient care. We create together the future of dental care, motivated by innovation, collaboration, and excellence.

Have a nice read!

Adrian N. Suarez Torres  
The Lydia Lopez Research Group, Newsletter Coordinator



# TABLE OF Contents

9  
REVOLUTIONIZING DENTISTRY: THE TRANSFORMATIVE IMPACT OF 3D PRINTING ON PATIENT CARE AND TREATMENT MODALITIES

13  
NAVIGATING THE DIFFERENCES BETWEEN BRACES AND CLEAR ALIGNERS

17  
IMPORTANCE OF EARLY INTERVENTION OF ORAL HABITS IN CHILDREN AND ITS EFFECTS

21  
THE GREAT IMPOSTOR DISEASE

25  
FROM ANCIENT REMEDIES TO PRECISION SOLUTIONS: THE TRANSFORMATIVE JOURNEY OF DENTAL PROSTHETICS

11  
MAXILLOFACIAL OSTEOMA: THE SILENT CLUE IN GARDNER SYNDROME DETECTION

15  
MOYER'S ANALYSIS ON TOOTH SIZE PREDICTION: WHY SHOULD TOOTH SIZE MATTER?

19  
SENSORY ROOM ESSENTIALS: CREATING A RELAXING ENVIRONMENT FOR CHILDREN WITH AUTISM SPECTRUM DISORDER

23  
FROM GREEK BEAUTY PHILOSOPHY TO MODERN DENTISTRY

27  
ENDO-INSIGHTS: EXPLORING INNOVATIONS IN ENDODONTIC THERAPY AND RESTORATIVE DENTISTRY

# TABLE OF Contents

29  
MINERAL TRIOXIDE AGGREGATE (MTA) IN ENDODONTICS: PROPERTIES, APPLICATIONS, AND CLINICAL CONSIDERATIONS

33  
FROM PULP TO HEART: CHRONIC APICAL PERIODONTITIS AND ITS RELATION TO CARDIOVASCULAR DISEASE

37  
UNDERSTANDING THE CONNECTION BETWEEN PERIODONTAL DISEASE AND SQUAMOUS CELL CARCINOMA: A DETAILED EXPLORATION

41  
FROM CONSULTATION TO PREVENTION: A PHARMACISTS ROLE IN HEALTHCARE AND ORAL HYGIENE

45  
DUST HAZARDS IN DENTISTRY: EFFECTS ON DENTISTS AND TECHNICIANS AND THE NEED FOR MORE RESEARCH ON SILICA

31  
MANAGEMENT OF AVULSED TEETH: CURRENT BEST PRACTICES

35  
EXAMINING THE ASSOCIATION BETWEEN PERIODONTAL DISEASE AND COLON CANCER

39  
BRIDGING THE GAP: ORAL HEALTH'S ROLE IN RESPIRATORY INFECTIONS, WITH A FOCUS ON PERIODONTITIS AND COVID-19

43  
THE JOURNEY OF PREGNANCY: COMPREHENSIVE CARE AND ADDRESSING ORAL CLEFTS

47  
DEDICATION

# Revolutionizing Dentistry: The Transformative Impact of 3D Printing on Patient Care and Treatment Modalities

## Introduction

In the realm of dentistry, the emergence of 3D printing stands as a transformative force, reshaping traditional practices and opening doors to unprecedented possibilities. As 3D printers become ubiquitous fixtures in dental laboratories and modern practices worldwide, their impact reverberates across various facets of oral care. From crafting intricate study and working models in resin to fabricating temporary fixed prosthetic restorations like crowns and bridges, the capabilities of these printers extend far beyond mere convenience. They pave the way for surgical guides, bite splints, and even complete removable prostheses, ushering in a new era of personalized treatment modalities. Yet, it is not merely the breadth of applications that defines the significance of 3D printing in dentistry. It is the promise it holds for the future that truly captivates the imagination. With advancements in metal printing techniques such as laser sintering and laser melting, the horizon expands to encompass surgical guides, custom-made meshes for bone regeneration, and bespoke implants tailored to individual anatomies. Looking ahead, the potential grows even more tantalizing. Monolithic zirconia crowns and bridges, veneers in lithium disilicate, and custom scaffolds for bone regeneration using hydroxyapatite/beta-tricalcium phosphate loom on the horizon, promising solutions for previously insurmountable challenges. The evolving landscape of dentistry, where each layer of innovation unveils new vistas of possibility. As we delve deeper into the intricacies of 3D printing technology and its impact on oral healthcare, we find ourselves at the intersection of tradition and transformation, witnessing the dawn of a new era in dental practice.

## Advancements and Variations in 3D Printing Technologies in Dentistry

The exploration of 3D printing technologies in dentistry through various modalities like Stereolithography (SLA), Digital Light Processing (DLP), Fused Deposition Modeling (FDM), Selective Laser Sintering (SLS), Photopolymer Jetting, Powder Binder Jetting, and Laser Bioprinting (LAB) reflects the dynamic landscape of dental manufacturing processes. Each modality offers unique advantages and limitations, catering to specific dental applications.

By: Diana Silva, DS III



The utilization of SLA and DLP showcases advancements in high-speed and high-accuracy printing, revolutionizing processes for creating custom, patient-specific designs such as crowns, dentures, surgical guides, and models. While SLA boasts accuracy and fine detailing, DLP addresses fabrication duration issues with its ability to cure entire layers at once. However, considerations regarding voxel size in DLP highlight the importance of resolution in achieving optimal outcomes. FDM and SLS/SLM introduce alternative approaches utilizing thermoplastic filaments and selective laser fusion of powdered materials, respectively. While FDM offers great bonding but is limited to thermoplastics, SLS/SLM broadens material options to include ceramics, metals, and polymers, enhancing applications in prosthodontics and removable partial denture frameworks. Photopolymer Jetting's multi-color printing capabilities present opportunities for esthetic dentistry, despite maintenance challenges. Powder Binder Jetting offers patient-specific maxillofacial prostheses, emphasizing early solutions for complex cases, albeit with delicate mechanical properties. Lastly, Laser Bioprinting merges additive manufacturing with biotechnology, promising regenerative therapies for periodontal regeneration and oral mucosal reconstruction, marking a significant leap in dental therapies. In the realm of dental materials, advancements in synthetic polymers, metals, and ceramics contribute to improved biocompatibility and mechanical properties, albeit with variations compared to conventional methods. Despite challenges such as inconsistent mechanical properties in ceramics, ongoing research seeks to address these limitations, paving the way for widespread adoption.

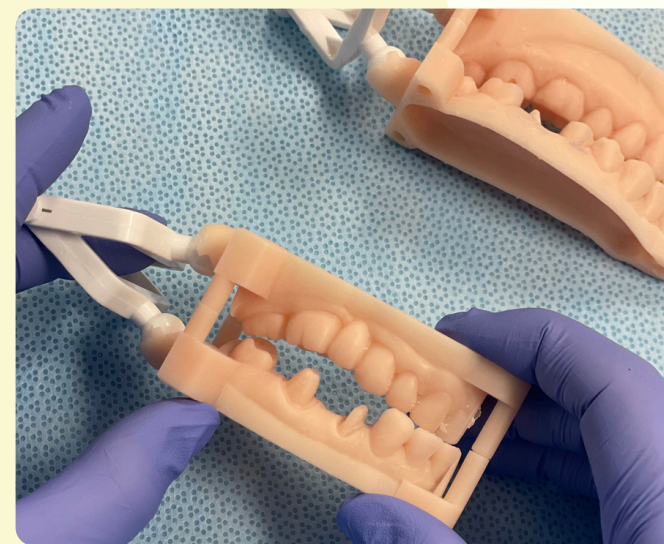


Figure 1: 3D Printed Dental Sextant Models take by Diana Silva

## Advancements and Variations in 3D Printing Technologies in Dentistry

Overall, the evolution of 3D printing technologies in dentistry underscores a transformative shift towards personalized, efficient, and innovative solutions, shaping the future of dental care delivery and patient outcomes. The rapid advancement of 3D printing technology has sparked a revolution in various fields of dentistry, offering unparalleled precision, efficiency, and customization. From prosthodontics to periodontics, orthodontics to endodontics, the applications of 3D printing are reshaping traditional practices and opening doors to innovative solutions.

In prosthodontics, the fabrication of crowns, fixed partial dentures, complete, and removable partial dentures have been streamlined through precise virtual models and CAD design, leading to more accurate and efficient restorations. The reduced production time and material usage make 3D printing an attractive option, particularly for provisional crowns and frameworks.

Implantology benefits from 3D-printed surgical guides, enhancing surgical precision and reducing risks. The transition from traditional panoramic radiographs to CBCT-based guides exemplifies the technology's impact on improving accuracy and patient outcomes. Additionally, the cost-effectiveness and simplicity of 3D-printed guides contribute to their widespread adoption.

In oral and maxillofacial surgery, 3D-printed surgical guides and custom implants revolutionize complex procedures, offering unparalleled accuracy and patient-specific solutions. The integration of CBCT data with CAD design ensures optimal outcomes, while advancements in materials expand possibilities for custom implants with adjustable properties.

Orthodontics sees a shift towards direct 3D-printed aligners, improving fit, efficacy, and stability compared to thermoformed alternatives. The accuracy and reproducibility of 3D-printed aligners offer a promising avenue for treating malocclusion with greater precision and patient comfort.

Endodontics benefits from guided cavity preparation and apicoectomy, minimizing deviations and improving surgical outcomes. The utilization of 3D-printed guides enhances precision and simplifies complex procedures, reducing risks and enhancing patient safety. Periodontics witness's advancements in scaffold fabrication for hard and soft tissue regeneration, providing customized solutions for periodontal defects. The ability to load scaffolds with stem cells and achieve intimate contact with bone surfaces accelerates the healing process and enhances esthetic results.



Figure 2: SIMtoCARE dental simulator taken by Diana Silva

Looking ahead, the future of 3D printing in dentistry holds immense promise, with ongoing developments in 4D printing and computed axial lithography poised to further revolutionize the field. The potential for shape-memory materials and faster production rates heralds a new era of customization and efficiency in dental care delivery. In conclusion,

3D printing technology continues to push the boundaries of innovation in dentistry, offering unprecedented opportunities for customization, precision, and patient care. As research and development efforts continue to evolve, the integration of 3D printing into dental practice promises to elevate standards of care and drive transformative advancements in patient outcomes and treatment modalities.

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# Maxillofacial Osteoma: The Silent Clue in Gardner Syndrome Detection

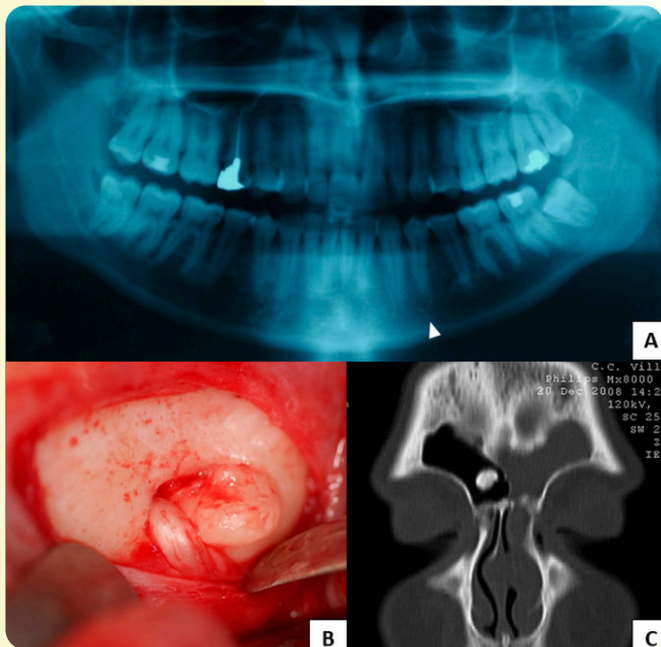
By: Joseluis Torres, DS III



## What is Gardner Syndrome?

Gardner syndrome (GS), initially described by Gardner Richards in 1953, is an autosomal dominant genetic disease, with 75% of cases inherited, and 25-33% resulting from spontaneous mutations (D'Agostino, S., 2023). It occurs from a mutation in the Adenomatous Polyposis Coli (APC) gene, a crucial tumor suppressor gene. This syndrome accounts for 10% of all familial adenomatous polyposis (FAP) cases, which is a condition in which the gastrointestinal tract gets covered with hundreds or thousands of polyps in the colon or rectum (John Hopkins Medicine, 2023). Gardner syndrome distinguishes itself from other diseases through its extraintestinal manifestations.

This syndrome is characterized by a triad of features: FAP, osteomas, and soft tissue tumors, though not all patients exhibit all three manifestations. Of these, intestinal polyps are the most significant, given their nearly inevitable progression to malignancy by up to 100%. Early detection thus holds great importance. Osteomas, occurring in 62%-82% of patients, represent the second most common feature and provide a critical entry point for dental professionals.



**Figure 3:** Clinical Case: (A) A GS patient complaining of pain in lower alveolar nerve region shows an anomaly of the ipsilateral mental foramen in panoramic radiogram (arrow); (B) intraoperative image of the osteoma associated with the nerve; (C) the same patient also showed an osteoma of the frontal sinus. Retrieved from D'Agostino, S, 2023.

## Relevance to Dental Profession

Diagnosing Gardner syndrome presents challenges due to the necessity of conducting both gastrointestinal endoscopy and molecular genetic analysis to confirm diagnosis. Additionally, intestinal polyps typically manifest their malignant potential between the ages of 30 and 50, underscoring the importance of timely detection. Without a family history of GS, individuals may remain unaware of their condition until it progresses to a critical stage. This is where the dentist's role becomes important.

Recent literature emphasizes mandibular and/or maxillofacial osteomas as potential early indicators of GS. For instance, Silvia D'Agostino's article highlights that osteomas and soft tissue lesions may precede the onset of familial adenomatous polyposis by up to 10 years (D'Agostino, S., 2023). In this same article, they gathered 19 patients which oral osteomas, and 100% of them had the APC mutation. Additionally, in a case study by Dan Yu, an osteoma was detected in a 22-year-old man (figure 4), and an APC mutation was confirmed by genetic analysis prior to the development of FAP, providing early intervention (Yu, D., 2018). Similarly, a 23-year-old female presenting with mandibular molar pain was diagnosed with an osteoma via panoramic X-ray at a dental clinic. Suspecting GS, the patient underwent gastrointestinal endoscopy, revealing benign intestinal polyps before they progressed to a malignant stage. Subsequent genetic testing confirmed the APC mutation, leading to a GS diagnosis by her primary care physician, facilitated by the dentist's referral (Inchingolo, F., 2015).

## Role of Dentists in Early Detection

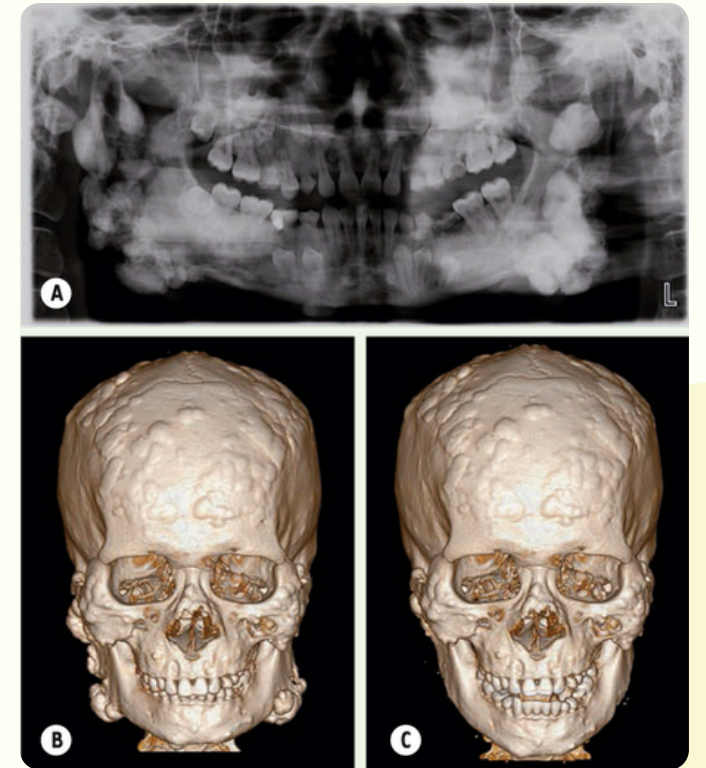
Dentists play an important role in the early detection of GS, given the likelihood of osteomas manifesting before the onset of malignant intestinal polyps. Through their understanding of clinical characteristics, meticulous family history assessments, and routine utilization of dental X-rays, the diagnoses and early management of GS can be done. Additionally, dentists should be aware that beside osteomas, dental abnormalities are prevalent in 30-75% of GS patients. Notably, 4% to 38% of GS patients exhibit impacted teeth, while 11-27% present with supernumerary teeth compared to the general population. These crucial findings demonstrate the importance of dentist education and awareness in recognizing and addressing potential signs of GS.

## Conclusion

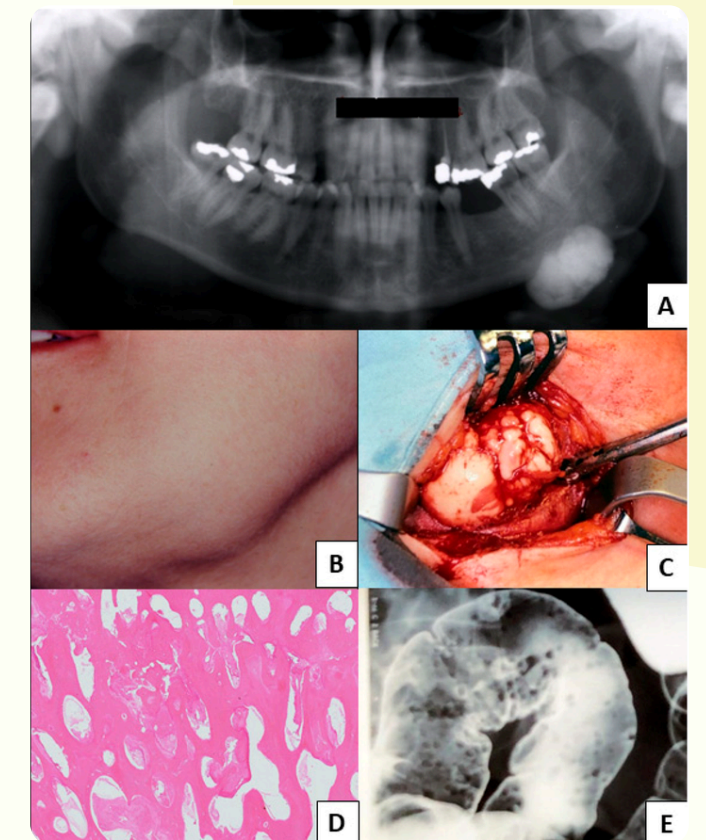
In conclusion, the involvement of dentists in the early detection of Gardner syndrome (GS) is of great importance. Through their understanding of clinical indicators, patient assessments, and routine dental examinations, dentists contribute significantly to identifying potential cases of GS before symptoms become severe. Furthermore, the recognition of osteomas and dental abnormalities as early warning signs underscores the importance of regular dental visits in overall health maintenance. By using their expertise, dentists not only improve patient outcomes but also serve as crucial partners in the interdisciplinary approach to managing GS.

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**Figure 4:** (A) Panoramic radiograph showing widespread radiopaque lesion and multiple impacted permanent teeth. (B) A preoperative CT view of multiple nodular lumps throughout the jaws and skull surface. (C) A postoperative CT showing a smooth counter line of mandible. Retrieved from Du, Y., 2018



**Figure 5:** Clinical Case 1. (A-D) Spongius osteoma of the lower margin of the mandible (panoramic radiogram, facial dysmorphism, intraoperative images, and histological hematoxylin-eosin, respectively); (E) the double-contrast barium enema shows the multiple polypoid lesions found in the same patient's colon. Retrieved from D'Agostino, S, 2023.



# Navigating the differences between braces and clear aligners

By: Valeria Cotto, DS III



## Introduction

Orthodontic treatment extends beyond mere aesthetics; it plays a vital role in enhancing oral health, hygiene, and fostering a confident smile. Additionally, orthodontic interventions address various concerns, spanning beyond dental issues to include jaw alignment and bite correction. Orthodontics has evolved significantly over the years, offering patients a variety of options. Among the comparisons and uncertainties individuals encounter, particularly in deciding between braces and clear aligners, it's crucial to recognize that each treatment serves distinct purposes. While braces are suitable for the majority, aligners' candidacy may not be universal. While both aim to correct dental misalignments and improve oral health, they differ in several key aspects, including design, treatment process, aesthetics, and lifestyle impact. This article explores these disparities to help individuals make informed decisions about their orthodontic care.

## Traditional Braces

Metal braces, consisting of metal brackets affixed to the teeth and wires threaded through them, remain the foundation of orthodontic treatment due to their unparalleled effectiveness in addressing a diverse range of dental issues such as protruding teeth, overcrowding, gaps in between teeth, misalignment, crossbites, underbites, and overbites. This time-tested orthodontic solution treats each individual shift of every tooth, yielding life-changing and dramatic results for patients seeking improved dental alignment. Notably, the affordability and insurance coverage of metal braces make them an accessible option for many individuals, with financing options available for those without coverage. Crafted from materials such as titanium and steel, metal braces are designed to withstand the daily wear and tear of brushing and chewing, ensuring durability throughout the treatment.

Despite their numerous advantages, metal braces are not without their drawbacks, chief among them being aesthetic concerns associated with their metallic appearance. Many individuals find the appearance of braces outdated and conspicuous, leading to feelings of self-consciousness during treatment. Additionally, the presence of brackets can occasionally lead to discomfort and irritation, particularly if a bracket rubs against the inside of the mouth, forming a sore. However, such discomfort can often be managed with orthodontic wax and typically resolves as the mouth adjusts to the hardware. Furthermore, dietary restrictions are necessary to prevent damage to the braces, with certain foods such as corn on the cob, taffy, and gum being off-limits to avoid bracket damage or food entrapment. Also, maintaining oral hygiene with braces requires diligence. Patients must brush and floss meticulously to remove food particles and plaque that can accumulate around brackets and wires. Specialized tools, such as interdental brushes and floss threaders, may be necessary to clean effectively. Despite these drawbacks, braces remain a highly beneficial orthodontic option for individuals of all ages and are capable of addressing even the most complicated dental misalignments with precision and efficacy.



## Clear aligners

Clear aligners represent a revolutionary approach to orthodontic treatment, offering a discreet and flexible alternative to traditional braces. These aligners are custom-made for each patient, resembling transparent mouthguards, and are virtually invisible when worn. The main advantage of clear aligners lies in their esthetic appeal, allowing individuals to undergo orthodontic treatment without the conspicuous appearance of metal brackets and wires. Additionally, the removable nature of aligners provides unparalleled convenience, as they can be easily removed for eating, drinking, and oral hygiene, eliminating dietary restrictions and facilitating easier maintenance of oral health.

However, it's essential to consider the limitations of clear aligners alongside their advantages. The higher cost of aligner trays compared to traditional braces underscores the importance of ensuring their proper use. Failure to do so may lead to the patient needing alternative treatments, including traditional braces, or, in severe instances, irreversible damage. Therefore, it is crucial for both orthodontists and patients to collaborate in making informed decisions that prioritize the patient's overall well-being. While effective for mild to moderate dental misalignments, severe cases may not be suitable for aligner treatment, necessitating alternative approaches such as traditional braces. Moreover, patient compliance is crucial for successful outcomes with clear aligners. Aligners must be worn for 22 to 23 hours per day and replaced regularly as directed by the orthodontist. Failure to adhere to wearing instructions can prolong treatment time and compromise the desired results.



Figure 7: Example of Clear aligners. Retrieved from Gawel, R. (2021).



Figure 8: The ultimate goal of orthodontics. Retrieved from Brands, S. D. 2023.

## Making an Informed Choice

The decision between clear aligners and traditional braces represents a significant step towards achieving optimal dental alignment and overall oral health. Both treatment options provide effective solutions, each with its own unique set of advantages and considerations. By meticulously assessing individual needs, treatment goals, and lifestyle factors, patients can make informed decisions that align with their preferences and priorities. Ultimately, the overarching goal of both aligners and traditional braces remains consistent: achieving a confident, beautiful smile that stands the test of time. By carefully weighing the advantages and considerations of each treatment option and consulting with a qualified orthodontic professional, patients can embark on their orthodontic journey with clarity and confidence, knowing they have chosen the pathway best suited to their unique needs and aspirations.

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# Moyer's Analysis On Tooth Size Prediction: Why Should Tooth Size Matter?

By: Jennifer Jiménez Cardona, DS III



## Introduction

Throughout history, the journey for straighter teeth has intrigued early civilizations from ancient Egypt to the Roman Empire.<sup>1</sup> Remarkably, cadaver remains reveal evidence of primitive wires and metal apparatus used by our ancestors to tackle the challenge of crowded, misaligned teeth. Despite these early attempts, the quest for a perfect smile has persisted through the ages, remaining a timeless challenge until modern times.

## Why Should Tooth Size Matter

Among all malocclusion types, dental crowding stands out as the most prevalent malocclusion in both mixed and permanent dentitions, significantly affecting dentofacial esthetics (Dos Santos CCO., 2023). The field of orthodontics has evolved to address the challenge of diagnosing and treatment planning for dental crowding. Many quantifiable measurements have been developed to assist clinicians in comprehending the spatial dynamics within the dentition. The process of space analysis requires the examination of inclination, positioning, vertical dimensions, and several other parameters. These factors aid the diagnosis of orthodontic issues in an individual. Most importantly, space analysis requires the comparison of space available, and space required to align teeth in the dental arches.

Clinicians analyze these factors collectively to accurately diagnose orthodontic cases. The measurements obtained from the patient represent the space available. However, unerupted teeth represent a unique challenge to obtain the measurement of space required. Specifically, in patients with mixed dentition, these teeth represent a measurement that cannot be acquired physically. For this reason, space predicting methods have been developed to estimate a quantifiable measurement for permanent teeth that cannot be measured physically.

One widely accepted method is Moyer's analysis, which predicts the mesiodistal size of maxillary and mandibular permanent canines and premolars using the mesiodistal width of the four permanent mandibular incisors. It suggests that the 75th percentile values are the most applicable in the general population. However, it's important to note that this prediction chart was created based on data from a Caucasian population, raising questions about its applicability to different ethnic groups. Similar research has been conducted with various populations, such as Pakistani, Iranian, and Lucknow populations.

Probability chart (Moyers Analysis)														
Probability chart for predicting the sum of the widths of upper 3,4, &5 on one side.														
Σ lower incisors	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0		
95%	21.6	21.8	22.1	22.4	22.7	22.9	23.2	23.5	23.8	24.0	24.3	24.6		
85%	21.0	21.3	21.5	21.8	22.1	22.4	22.6	22.9	23.2	23.5	23.7	24.0		
75%	20.6	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.9	23.1	23.4	23.7		
65%	20.4	20.6	20.9	21.2	21.5	21.8	22.0	22.3	22.6	22.8	23.1	23.4		
50%	20.0	20.3	20.6	20.8	21.1	21.4	21.7	21.9	22.2	22.5	22.8	23.0		
35%	19.6	19.9	20.2	20.5	20.8	21.0	21.3	21.6	21.9	22.1	22.4	22.7		
25%	19.4	19.7	19.9	20.2	20.5	20.8	21.0	21.3	21.6	21.9	22.1	22.4		
15%	19.0	19.3	19.6	19.9	20.2	20.4	20.7	21.0	21.3	21.5	21.8	22.1		
5%	18.5	18.8	19.0	19.3	19.6	19.9	20.1	20.4	20.7	21.0	21.2	21.5		

Probability chart for predicting the sum of the widths of lower 3,4, &5 on one side.														
Σ lower incisors	19.5	20.0	20.5	21.0	21.5	22.0	22.5	23.0	23.5	24.0	24.5	25.0		
95%	21.1	21.4	21.7	22.0	22.3	22.6	22.9	23.2	23.5	23.8	24.1	24.4		
85%	20.5	20.8	21.1	21.4	21.7	22.0	22.3	22.6	22.9	23.2	23.5	23.8		
75%	20.1	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1	23.4		
65%	19.8	20.1	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1		
50%	19.4	19.7	20.0	20.3	20.6	20.9	21.2	21.5	21.8	22.1	22.4	22.7		
35%	19.0	19.3	19.6	19.9	20.2	20.5	20.8	21.1	21.4	21.7	22.0	22.3		
25%	18.7	19.0	19.3	19.6	19.9	20.2	20.5	20.8	21.1	21.4	21.7	22.0		
15%	18.4	18.7	19.0	19.3	19.6	19.8	20.1	20.4	20.7	21.0	21.3	21.6		
5%	17.7	18.0	18.3	18.6	18.9	19.2	19.5	19.8	20.1	20.4	20.7	21.0		

Figure 9: Moyers probability chart used for predicting the sum of the widths of upper and lower 3,4,5 respectively. Retrieved from Bindayel, N., 2011.

## Results

In the Pakistani population, Moyer's prediction chart proved unable to predict the mesiodistal width of this group's unerupted canines and premolars. First, there was significant differences between tooth size in genders. Males exhibited larger first molars and canines in the mandible in contrast with females ( $p<0.05$ ). Second, the difference between tooth size predicted and measured data was also statistically significant ( $p<0.05$ ) (Rehan, SA., 2023)

Similar research in the Iranian population demonstrated Moyer's analysis may be used at 65% probability level for male subjects for a more predictable outcome. In females, Moyer's prediction analysis proved more reliable at the 75% and 85% percentile for the maxillary arch and the 50% and 65% probability for the mandibular arch (nik Tahere, H., 2007).

The Lucknow population has also proved unapplicable to Moyer's method. Differences between the actual and predicted values of upper and lower permanent canines and premolars were statistically significant in both males and females ( $p<0.05$ ), demonstrating this method is not applicable to the Lucknow population (Grover, 2017). These research and others have created doubt in the orthodontic community regarding the reliability of this analysis as it has shown the method tends to overpredict the necessary space.

## Conclusion

Therefore, it becomes essential to evaluate the reliability of Moyers' method within specific populations, such as the Hispanic community. There exists a significant knowledge gap concerning this demographic. Hispanics represent the largest ethnic minority in the United States, consisting nearly 20% of the total population. Research focusing on Moyers' analysis within the Hispanic population aims to assess clinicians with a tool to make informed decisions about the care they are providing to their patients. Research in this area will enrich our understanding of orthodontic diagnostic methods advancing us with a step further into the journey of a brilliant and confident smile.

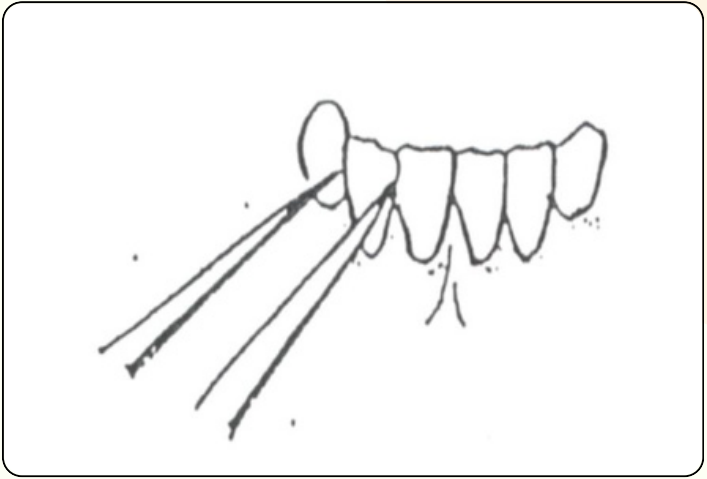


Figure 10: Moyers analysis is performed by measuring the mesiodistal width of the four mandibular incisors. With those measurements, the clinician must find the value obtained in the top horizontal column of Moyer's probability chart. Reading downward in the appropriate vertical column, obtain the value expected of the width of canines and premolars. Ordinarily, the 75% level of probability is used. After this value is obtained, the space available in each dental arch is measured on the study models from the primary canine to the primary second molar. This value is then compared with the value obtained from the probability chart to establish space excess, insufficiency or adequacy. Retrieved from Bindayel, N., 2011.

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# Importance of early intervention of oral habits in children and its effects

By: Carla Ramírez Rivera, DS III



## Oral Habits

An oral habit is any repetitive pattern involving the tongue, teeth, and mouth. Oral habits such as thumb-sucking, tongue-thrusting, nail-biting, and mouth breathing are quite common in babies and young children. While some children stop these habits on their own, others require additional help. If these habits persist and are not corrected, they can have harmful effects on dental alignment, facial structure, speech, and breathing habits in children, which may last into adulthood. Therefore, parents must pay attention to their children's oral habits. The American Association of Orthodontists (AAO) recommends that children receive their first orthodontic check-up at age 7 (AAO, 2024). Reasoning behind this recommendation arises from the fact that children have a mix of primary and permanent teeth at this age, and malocclusion can be corrected in its earliest stages.



**Figure 11:** Thumb-sucking habit seen in babies. Photo retrieved from Dhulia, M., 2020

## Effects of Oral habits

Oral habits like thumb-sucking, tongue-thrusting, and nail-biting can have negative effects on teeth occlusion, speech, and the development of the face and jaws. Thumb-sucking can lead to an open bite, or overbite, and interfere with the normal growth of permanent teeth. This can cause difficulty in forming sounds during speech due to malocclusion. While many people are aware of thumb-sucking and nail-biting, few know of tongue-thrusting. Tongue-thrusting occurs when the tongue is repeatedly pushed against the teeth and is visible when a child speaks, protruding between the teeth. Like thumb-sucking, tongue-thrusting can cause similar effects such as an open bite and crowded teeth. Mouth breathing can lead to other dental issues such as dry mouth and gingivitis. Having a dry mouth makes it more prone for children to have dental caries.

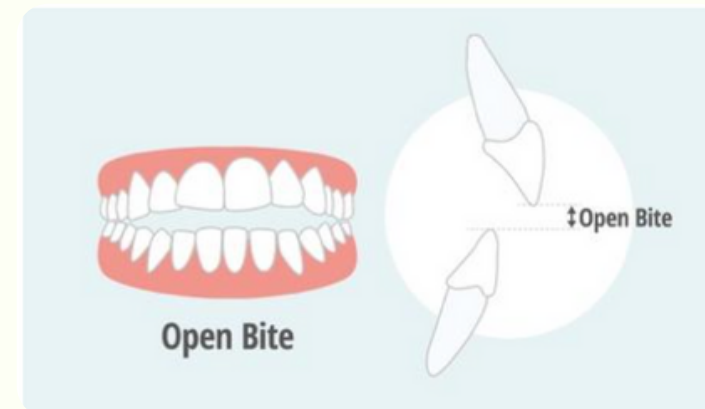
When I was a child, I used to suck my thumb because of my introverted personality. Thankfully, my parents noticed this habit early and helped me break it. This proved to be a wise decision as it prevented future problems with my dental occlusion.



**Figure 12:** Tongue-thrusting habit seen in children. Photo retrieved from Jupiter Kids Dentistry and Orthodontics.

## Early Intervention

Early intervention can be crucial in preventing malocclusion in children. One of the most common types of malocclusions is an open bite, which is visible in Figure 13. Open bite can be caused by thumb sucking and tongue thrusting. Parents should identify any bad oral habits that their children may have and take steps to minimize their potential effects. If an oral habit is identified, seeking help from an orthodontist is essential to diagnose and manage the malocclusion caused by the habit. Habit-breaking appliances can then be applied to help break an oral habit (Oral Habits in Pediatric Patients, 2022).



**Figure 13:** Example of an Open Bite. Retrieved from Thurman, B., 2022.

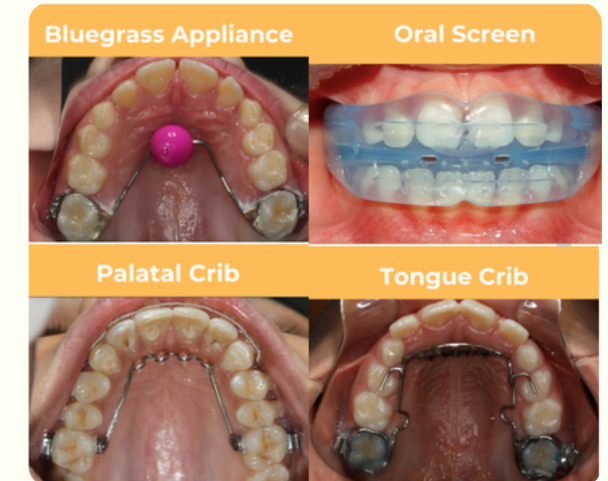
## Orthodontic Misconception

Many people believe that orthodontic treatment is necessary only for cosmetic reasons. However, this is a misconception. The benefits of orthodontic treatment extend beyond just improving the appearance of one's smile. Properly aligned teeth are vital for maintaining good oral health. Straight teeth are easier to clean, making them less susceptible to tooth decay and periodontal disease. Oral habits interfere not only with the correct positioning of teeth, but also with the development of the face and jaws. Another reason why its early intervention is crucial.

## Treatment of Oral Habits

The treatment for oral habits involves attempting to break the habit. If this is not possible, a habit appliance must be placed by an orthodontist. A habit appliance is a device that is placed behind the front teeth, on the palate area, and is connected to the molars that keep it in place.

There are different kinds of habit appliances that may be removable or fixed. These appliances are usually made of metal and resemble retainers. Some examples of habit appliances are: palatal crib to eliminate thumb-sucking, tongue crib to eliminate tongue-thrusting, bluegrass appliance to eliminate thumb-sucking, and an oral screen to eliminate the habit of breathing through the mouth (Habit Breaking Appliances and Their Benefits, 2021).



**Figure 14:** Different oral appliances. Retrieved from Mittal, R., 2014.

## Conclusion

Parents play a vital role in ensuring their children's oral health. Being mindful of their habits and intervening early can go a long way in promoting healthy dental and facial development. However, if the habits persist, it is crucial to opt for habit-breaking appliances by going to see an orthodontist or general dentist. By doing so, parents can help their children maintain excellent oral hygiene and prevent any potential dental issues down the road. Remember, a little effort today can go a long way in ensuring a bright and healthy future for your child's smile.

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# Sensory Room Essentials: Creating a Relaxing Environment for Children with Autism Spectrum Disorder

By: Valeria Vega, DS III



## Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by challenges in social interaction, communication, and a tendency toward repetitive behaviors and restricted interests. First formally identified by Dr. Leo Kanner in 1943 and later expanded upon by Dr. Hans Asperger, ASD affects individuals differently, leading to a spectrum of manifestations and abilities. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), ASD encompasses a range of conditions previously considered separate, including autistic disorder, Asperger syndrome, and pervasive developmental disorder not otherwise specified (Gutierrez, 2021).

The prevalence of ASD has been increasing, with recent estimates suggesting that approximately 1 in 54 children in the United States is diagnosed with the condition. This rise in diagnosis can be attributed to broader diagnostic criteria and increased awareness among healthcare professionals and the public. Children with ASD often exhibit sensory processing difficulties, meaning they may be hypersensitive or hyposensitive to sensory stimuli such as sounds, lights, textures, and smells. These sensory issues can significantly impact their daily lives, making environments that are typical for neurotypical individuals overwhelming or under-stimulating for those with autism.

## Sensory Rooms:

Sensory rooms have emerged as a valuable tool in helping children with autism manage these sensory challenges. By providing a controlled, soothing environment tailored to their sensory needs, sensory rooms can help reduce anxiety, improve focus, and promote overall well-being. This article explores the essential elements and best practices for creating a sensory room that supports and enhances the sensory experiences of children with ASD. When creating a sensory room for children with ASD it involves a thoughtful and strategic approach to design, ensuring that the environment provides for their unique sensory processing needs.

There are many ways to create these sensory spaces in dental waiting rooms or hospital waiting rooms. We can start by choosing an appropriate space that is quiet, easily accessible, and free from distractions. This should be a dedicated room; however, a designated area within a larger room can also be effective if space is limited.



Figure 15: Sensory room example Photo retrieved from Mike Ayres Desing UK.

## Visual, tactile and auditory stimulation:

Lighting plays an important role in setting the tone of the sensory room. It should be soft, diffused lighting that can be adjusted to various levels of brightness, this helps to create a calming environment. Avoid using fluorescent lights, as they can be overly stimulating and uncomfortable. Also, visual stimulation can be achieved by bubble tubes, fiber optic lights, and projector lights, which create engaging and soothing visual aids.

Incorporating a variety of textures is essential for providing tactile stimulation. An example of this stimulation can be textured fabrics, sensory balls, and squishy toys. This allows children to engage in tactile exploration. Moreover, a tactile wall or sensory table with different textures can offer a great sensory experience. Additionally, incorporating weighted items like blankets, and vests, can provide deep pressure stimulation, helping to reduce anxiety and promote a sense of security for the children with ASD.

As for auditory elements, such as nature sounds, white noise machines, or calming music, can further enhance the room's calming effect by masking external noises and creating a peaceful auditory environment.

## Dental Settings

Integrating sensory rooms in dental settings can be very beneficial for children with ASD. Dental visits often involve bright lights, unfamiliar sounds, and physical sensations that can be overwhelming for children with sensory sensitivities. Sensory rooms provide a calming atmosphere where children can prepare themselves before their dental appointments, reducing anxiety and helping them feel more comfortable. By interacting with sensory stimulant equipment and activities, children can enter in a more relaxed state, which can make the dental procedures smoother and more efficient for both the child and the dental practitioners. This offers dental professionals a way to better connect with their young patients, building trust and making each appointment a better environment for children with ADS.

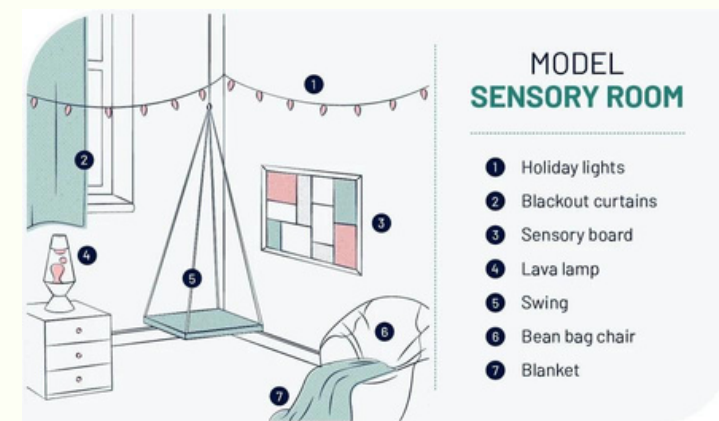


Figure 16: Sensory room model Guide Photo retrieved from Alex Heinz

Sensory rooms can also promote positive associations with dental visits, as they can transform a probable stressful experience into a more manageable and even enjoyable one. This approach can improve the child's cooperation during dental procedures, strengthen their overall dental health, and make future visits less scary. By creating an environment that acknowledges the unique sensory needs of children with ASD, dental practices can significantly improve the patient experience and outcomes.

## Conclusion

By integrating these elements and prioritizing personalization and safety, a sensory room can become a therapeutic space that supports the unique sensory needs of children with autism, promoting relaxation, self-regulation, and sensory exploration (Gutierrez, 2021). Thoughtful design and careful consideration of each child's preferences and needs can transform a sensory room into a sanctuary that significantly improves their quality of life.

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# The Great Impostor Disease

By: Deyanira Barduena, DS III



**Figure 17:** Clinical Case: (A) A GS patient complaining of pain in lower alveolar nerve region shows an anomaly of the ipsilateral mental foramen in panoramic radiogram (arrow); (B) intraoperative image of the osteoma associated with the nerve; (C) the same patient also showed an osteoma of the frontal sinus. Retrieved from D'Agostino, S, 2023.

Much like a chameleon, temporomandibular disorders (TMD) have a knack for imitating a variety of conditions and presenting with a diverse array of signs and symptoms. Unfortunately, this aspect of the orofacial complex is frequently overlooked, leading to cases where conditions affecting it go undiagnosed or are misdiagnosed. It's as if this area of the body is playing hide-and-seek making it challenging to accurately identify and address the root cause of discomfort for many individuals. While research suggests that over 30% of people experience some type of TMJ dysfunction, a large number of cases are incorrectly diagnosed. Many individuals in this group find themselves moving from one specialist to another in search of relief from persistent head pain.

Temporomandibular joint (TMJ) disorders involve a spectrum of issues impacting the jaw joint and the muscles responsible for jaw movement. From discomfort and pain to jaw dysfunction and associated symptoms like headaches, earaches, and difficulty chewing, TMJ disorders can truly be a hassle. Effective management of TMD does not have to be daunting. In fact, it often involves a blend of self-care practices, conservative treatments, and in some cases, surgical interventions.

## Self-Care and Lifestyle Modifications

For many individuals with mild TMJ symptoms, simple self-care practices and adjustments to one's lifestyle can often do wonders in easing discomfort and enhancing jaw functionality. These may include:

- **Resting the Jaw:** Avoid excessive jaw movements, like chewing gum or biting nails/objects/ice, and minimize activities that strain the jaw joint.
- **Applying Heat/ Cold Packs:** Alternating between warm compresses and cold packs can help reduce muscle tension and alleviate pain.
- **Eating Soft Foods:** Temporarily switching to a soft diet can reduce strain on the jaw joint and muscles, allowing for healing.
- **Practicing Stress Management Techniques:** Stress can exacerbate TMD symptoms, so techniques such as deep breathing, meditation, or yoga may help alleviate tension in the jaw muscles.
- **Improving Posture:** Maintaining good posture can prevent strain on the neck and jaw muscles, reducing TMJ-related discomfort.



**Figure 18:** (A) Panoramic radiograph showing widespread radiopaque lesion and multiple impacted permanent teeth. (B) A preoperative CT view of multiple nodular lumps throughout the jaws and skull surface. (C) A postoperative CT showing a smooth counter line of mandible. Retrieved from Du, Y., 2018

## Conservative Treatments

When your efforts in self-care hit a roadblock and those TMD symptoms refuse to budge, healthcare providers may recommend conservative treatments, including:

- **Medications:** NSAIDs, muscle relaxants, and pain relievers may be prescribed to reduce pain and inflammation associated with TMJ disorders.
- **Physical Therapy:** A jaw-rney filled with exercises, manual therapy techniques, transcutaneous electrical nerve stimulation (TENS) and the touch of ultrasound therapy. Together, working tirelessly to enhance jaw mobility, strengthen muscles, and alleviate TMJ-related pain.
- **Orthosis Therapy:** Custom-made oral appliances, such as occlusal splints or bite guards, can help stabilize the jaw joint, prevent teeth grinding (bruxism), and reduce muscle tension during sleep. With their help, the jaw joint finds stability, and people can rest easy knowing their teeth are protected.
- **Behavioral Therapy:** Enter the realm of cognitive-behavioral therapy (CBT) and biofeedback techniques, to learn the art of stress management and jaw relaxation. It's like unlocking secret powers within yourself, mastering the art of jaw clenching prevention, and finding inner peace amidst the TMJ turmoil.

## Advanced Interventions

On the flip side, when faced with more intricate scenarios of severe/ persistent TMJ disorders, it may call for some advanced interventions to tackle underlying structural or functional issues head-on. These may entail:

- **Injections:** Tiny doses of corticosteroids, hyaluronic acid, or even botulinum toxin (aka Botox) injected directly into the joint. These little warriors can wage war against inflammation, alleviate pain, and enhance jaw function for some individuals grappling with TMJ disorders.
- **Arthrocentesis:** A gentle stream of sterile fluid flushing through the TMJ, washing away debris and soothing inflammation. This minimally invasive procedure can work wonders in improving joint mobility and providing relief.
- **Arthroscopy:** Picture a miniaturized surgical expedition into the depths of the TMJ, guided by a tiny camera. With surgical precision, adhesions, damaged tissue, or misbehaving discs are vanquished, paving the way for smoother joint function.
- **Open Joint Surgery:** In dire situations where the TMJ has endured significant damage or structural abnormalities, it may be time for the grand finale – open joint surgery. Here, skilled surgeons repair, reposition, or even replace damaged TMJ components, like a masterful restoration project.
- **Orthodontic Treatment:** Sometimes, the culprit behind TMJ woes lies in misaligned teeth or malocclusion. Enter orthodontic interventions, armed with braces or sleek clear aligners, ready to realign those pearly whites and restore harmony to your jaw's kingdom.

In conclusion, effective management of the great impostor disease involves a multidisciplinary approach that need to be tailor to the individual needs and severity of symptoms. By working closely with healthcare providers like dentists, oral surgeons, physical therapists, and behavioral specialists, individuals with TMJ disorders can explore various treatment options and develop a comprehensive management plan to improve jaw function and quality of life.

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# From Greek Beauty Philosophy to Modern Dentistry

By: Ricardo Gelpí, DS III



The most important aspects of beauty in ancient Greek society were symmetry and proportion. The magnetism of facial beauty arises from the harmonious interplay of features that evoke pleasure and satisfaction. A person's confidence is significantly influenced by the outward appearance of their face. A symmetrical and proportionate face is often deemed ideal, radiating attractiveness and confidence. Thus, achieving facial and dental beauty entails maintaining precise proportions, symmetry, and dimensions in both the face and teeth (Quynh Huong et al, 2024). Therefore, the allure of a captivating smile transcends mere aesthetics; it embodies charisma and self-assurance. Within the realms of prosthodontics and restorative dentistry, anterior teeth aesthetics hold a paramount significance. The contemporary landscape of cosmetic dental treatments bears witness to an escalating demand for natural-looking results, underscoring the pivotal role of anterior teeth aesthetics in modern dentistry.

## Understanding Anterior Teeth Esthetics

At the heart of anterior tooth aesthetics lie a multitude of factors, including tooth shape, size, and captivating smile, exerting profound influence over facial appearance and overall attractiveness. Kokich et al. outline five fundamental aesthetic aspects in dentistry:

- Ensuring the midline alignment remains straight, even if not precisely centered on the face, is crucial. Central incisor symmetry plays a vital role in this aspect.
- Establishing the orientation of the occlusal plane.
- Placing the incisal edges correctly.
- Harmonizing the incisal and smile lines involves seeking aesthetic consistency between the incisal line and the curvature of the lower lip. Moreover, the smile line should mirror the convexity of the lower lip.
- Addressing the management of gingival margins.

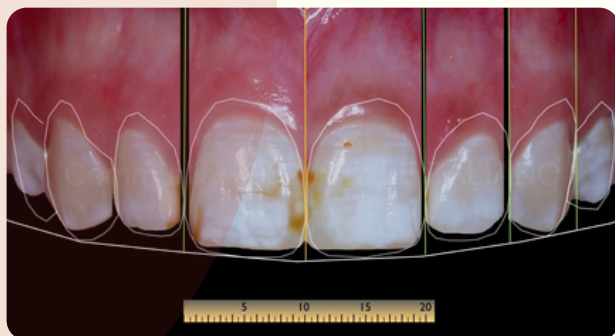


Figure 19: Golden proportion smile design. Retrieved from Aziz et al, 2017.

## Advancements in Materials and Techniques

Embarking on the crest of progress, contemporary anterior teeth restorations stand as testaments to technological prowess and scientific acumen. Zirconia, lithium disilicate, and composite resins emerge as vanguards of innovation, endowing restorations with unparalleled strength, translucency, and color-matching capabilities. These materials, harnessed in tandem with cutting-edge techniques, converge to forge lifelike aesthetic outcomes that seamlessly blend with natural dentition.

## Digital Smile Design and Smile Analysis

Within the realm of digital dentistry, the emergence of digital smile design heralds a paradigm shift in treatment planning and visualization. Smile analysis, digital wax-ups, and virtual smile simulations empower both patients and practitioners, fostering collaborative engagement in the pursuit of aesthetic perfection. Through these innovative tools, anterior teeth aesthetics are meticulously sculpted, refined, and tailored to meet the unique desires and expectations of each patient.

## Minimally Invasive Approaches to Aesthetic Enhancement

Embracing the ethos of preservation, minimally invasive approaches stand as paragons of virtue in anterior teeth aesthetics. Veneers, inlays/onlays, and composite bonding are regarded as conservative techniques to preserve precious tooth structure while bestowing upon patients the gift of radiant smiles. These techniques, characterized by their subtlety and finesse, form the cornerstone of comprehensive smile makeovers, orchestrating transformative outcomes with minimal intervention.

Ceramic veneer restorations in the anterior region are effective in reshaping and enhancing the color of teeth while ensuring proper shape and closing diastemas. This contributes to horizontal stability in the dental arch and enhances the patient's overall aesthetics. Additionally, both porcelain veneers and crowns can successfully address tooth discolorations resulting from factors like trauma, fluorosis, tetracycline staining, hypocalcifications, and other factors (Quynh Huong et al).

Resin-based composites can provide aesthetically pleasing restorations due to their combination of opaque and translucent materials. Opaque shades are typically utilized for inner restorations resembling dentine or for creating opaque margins, while translucent shades are applied as final layers or to achieve incisal translucencies. These shades are commonly referred to as "dentin" for opaque hues and "enamel" for translucent ones. The aesthetic success of RBC restorations hinges on several factors, including material properties, opacity and translucency of the composite, adhesive techniques, shade matching, operator proficiency, surface texture, and biological considerations. However, RBCs do have limitations, notably in terms of fracture resistance and surface stability when compared to ceramic restorations (Quynh Huong et al).

In the symphony of anterior teeth aesthetics, each note resonates with the melody of innovation, collaboration, and patient-centric care. As the field continues to evolve propelled by progress, it behooves dental professionals to remain steadfast in their commitment to excellence. Through interdisciplinary collaboration, informed decision-making, and a steadfast dedication to advancement, prosthodontists and restorative dentists stand poised at the precipice of a new frontier—one where anterior teeth aesthetics transcend mere beauty to encapsulate the essence of human expression.

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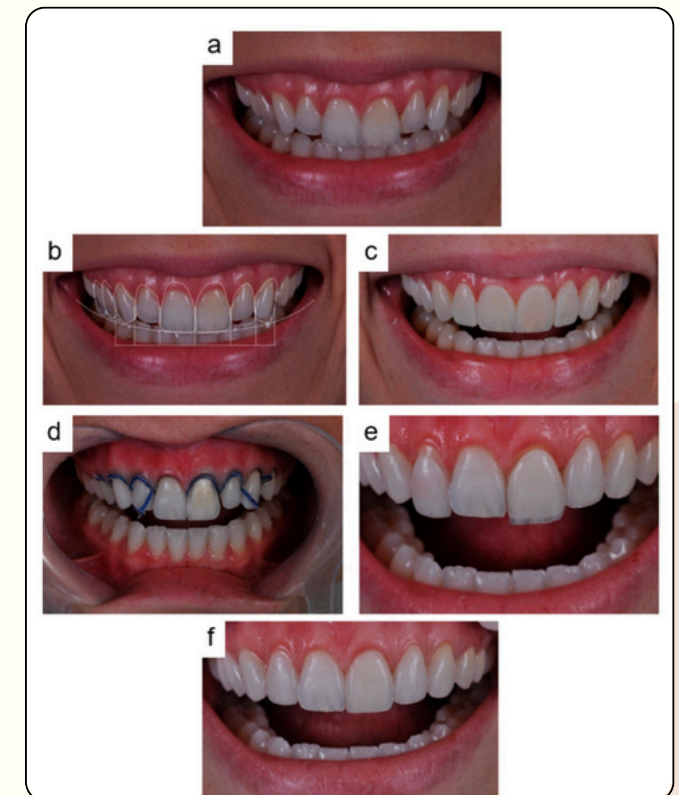


Figure 20: Teeth of a 31-year-old male with esthetic teeth with ideal functional and biological conditions. (a) Pretreatment photographs, (b) digital smile design, (c) mock-up, (d) tooth preparation, (e) ceramic veneer, and (f) cementation. (Caetano et al, 2023).



Figure 21: Teeth of a 27-year-old female before and after direct resin-based composite restoration to improve aesthetics and function. Closure of diastema, anatomical completion due to wear facets. Photo taken by Ricardo Gelpí.



# From Ancient Remedies to Precision Solutions: The Transformative Journey of Dental Prosthetics

By: Kiany Serrano, DS III



## Golden Smiles and Ancestral Teeth

Dental prostheses have been used since prehistoric times. The Etruscans, who lived between 1000 and 400 BCE, are among the first people to be known to have made dental bridges by fastening gold rings on teeth that were in good condition (figure 22). Evidence from Egyptian skeletons with gold-filled teeth and false teeth secured by clasps have been revealed, while mummified remains revealed sets of artificial teeth fashioned from wood and brass, or carved ivory attached to gold plates.

The Mayans were known for their intricate dental modifications, often adorning their teeth with gems and engravings. These practices were not merely decorative but held cultural and social significance within Mayan society. The Tepantitla Mural (figure 23) in Mexico provides a glimpse into the dental activities of the time. In this depiction, a Teotihuacan character is depicted engaging in dental procedures. Those tooth gems in social networks aren't so original after all!

There is little evidence of dental prosthesis among the Greeks. However, certain discoveries, like skulls with gold foil fillings, point to dental prosthesis usage, and their literary references provide some information too. They note how people used carved wooden teeth in their edentulous spaces.

Records from the Roman era provide insight into the field of dental prostheses. Martial, a famous Roman poet, described how novel people got teeth from the poor, how they were attached to their mouth, and how they also used ivory teeth. Furthermore, a fascinating find in a Roman tomb turned up the bones of a woman who had a full set of dentures on a gold base. Seems that these important civilizations knew the importance of a full smile and were advanced in the use of metal in prostheses. But how did the monarchy deal with it, and did the French show their buoyancy through a toothless smile?



Figure 22: Etruscan dental pontics. ancientanatomies. (2017, October 23). Etruscan Dentures. Wordpress.com:WordPress.com. <https://ancientanatomies.wordpress.com/2017/10/23/etruscan-dentures/>

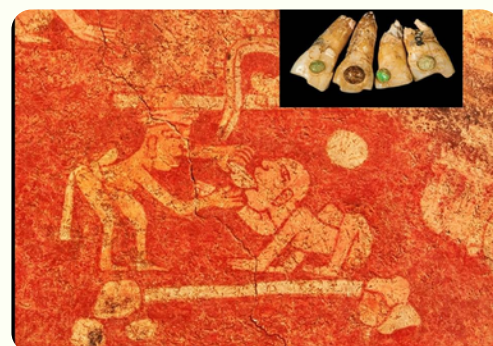


Figure 23: Shaman and patient. Ugalde MFJ. Tepantitla, Teotihuacan. A depiction of dentistry. Rev ADM. 2015;72(3):164-168..

## The Renaissance of Teeth

In Europe, scientific research was returning at the same time that dentistry was becoming more popular. Even while ivory teeth were quite popular among the nobles, they quickly decayed and developed bad tastes and smells. Furthermore, a lot of the time these prosthetics prevented people from eating and speaking normally, which highlights how little comfort and accuracy were valued in this era. Queen Elizabeth's habit of using cotton to cover her toothless gaps when making public appearances is a prime example of this.

In addition to his work in dentistry, Pierre Fauchard also made contributions to the field of dental prostheses. Fauchard created an entire upper denture set for a noblewoman in 1737, using springs to hold them in place. Although Fauchard's dentures were mainly made of animal bone. It was also very common for lower classes to sell their teeth to dentists, but due to poor oral hygiene, they were not in perfect shape. Therefore, he suggested using porcelain for prosthetic teeth as early as 1728.

The Chinese were skilled in the art of porcelain-making, but it wasn't until 1717 that a European named d'Entrecolles won their trust and was able to acquire the techniques of production. The recipe for porcelain was refined over time, and it was first brought to France in 1774 by the Frenchman Duchateau, who was trying to make his ivory dentures better. By 1789, the porcelain method had been introduced to the French Academy of Science and the Paris Faculty of Medicine through collaboration with De Chémant. Porcelain gained a firm foothold in prosthetic dentistry with the issuance of the Louis XVI patent (figure 25). Vive la résistance!

## How America Changed Dentistry

John Woofendale is recognized for creating the first complete set of dentures in colonial America when he arrived in 1766. One other noteworthy person who pioneered the use of flat clasps rather than wires to secure dentures was James Gardette, a French dentist who practiced in America. Gardette is also recognized for having introduced the idea of installing artificial teeth using suction, or atmospheric pressure. American dentist John Greenwood rose to prominence by creating dentures for George Washington out of the ivory of hippos. To avoid acid buildup, Greenwood stressed the value of good oral hygiene and suggested Washington to soak the dentures in port wine and wash them with water.

Although porcelain teeth were first created in France, mass production of porcelain teeth was pioneered by American manufacturers, increasing their accessibility. Antoine Plantou introduced porcelain teeth to the United States in 1817. Charles Goodyear's (yes, the same guy from the tires) discovery of rubber in the 1840s paved the way for the creation of vulcanite, a durable rubber substitute. Because it was so inexpensive and simple to use, Nelson Goodyear, Charles' brother, revolutionized dental prosthetics in 1855 when he developed a process for creating vulcanite dental plates.

Polymethylmethacrylate, sometimes known as acrylic resin, became the standard material for denture bases and plastic teeth by 1938. Because of its translucency, hardness, and inertness, acrylic resin provided a sturdy and reasonably priced denture alternative.

In the end, no matter the time or the civilization, nobility or peasant, all this history let us know that a smile, or the lack of it, has been a problem to humanity and in actuality, a problem that is the difference between likes or death.



Figure 24: Lower denture in which the tooth bearing sections only have been made in red vulcanite. Stephens, C. (2023). A brief history of the development and use of vulcanised rubber in dentistry. British Dental Journal, 234(8), 607-610. <https://doi.org/10.1038/s41415-023-5735-7>



Figure 25: Vulcanite Denture. The History Of Dentures -Time Line From 700 BCE.(n.d.). [https://www.bremadent.co.uk/uploads/4/8/6/4/48649227/history\\_of\\_dentures.pdf](https://www.bremadent.co.uk/uploads/4/8/6/4/48649227/history_of_dentures.pdf)



Figure 26: Polymethylmethacrylate denture. Pelletier, L. (2021, January 20). The dental prosthesis from yesterday to today - Dentistry Online. Dentistry.co.uk; Dentistry Online. <https://dentistry.co.uk/2021/01/20/dental-prosthesis-yesterday-today/>

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5. dental Ivory & porcelain Dentures - Van Leest Antiques. (2024, January 31). Van Leest Antiques. <https://www.vanleestantiques.com/product/7-ivory-and-porcelain-dentures-circa-1760-1840/>



# Endo-Insights: Exploring Innovations in Endodontic Therapy and Restorative Dentistry

By: Maria Bras, DS III



## Multidisciplinary Challenges in Restorative Dentistry

The restoration of endodontically treated teeth presents one of the most challenging scenarios in clinical practice as it involves procedures spanning multiple disciplines, including Endodontics, Operative Dentistry, and Prosthetics. These restorations aim to replace structures lost during endodontic treatment, such as those accessed during instrumentation of the pulp chamber and root canal system, as well as the removal of carious tissue and temporary restorations. Following completion of the endodontic procedure, it is essential to restore the access and other tooth structures removed during the procedure using non-temporary materials to preserve the endodontic treatment and prevent issues like microleakage and caries.

## Composite Resin and Acid Etching in Restorations

It is common practice to restore access preparations with composite resin as a definitive or intermediary restoration before placing a crown. Acid etching is typically employed during this process to enable adhesion of the composite resin to the remaining tooth structure. Acid etching roughens the enamel surface to facilitate adhesive application, enhancing resin sealant retention. However, proper execution of etching and bonding is crucial and requires a dry environment for optimal success. Improper acid etching and bonding may result in incomplete sealing of the access cavity, leading to microleakage of bacteria, saliva, and contaminants into the root canal system, potentially compromising treatment success.

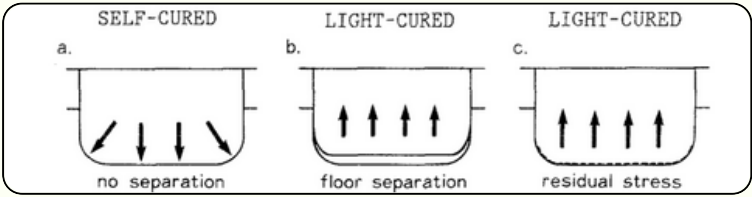


Figure 27: a, Polymerization of self-cured composite resin is aided by warm cavity wall and contracts toward it. B, Light-cured composite resin polymerizes from above and contracts towards surface, separating from cavity wall. C, Restriction of contraction by bonding agent creates stress in cavity wall. Retrieved from: Fusayama, T. (1992).

## Timing and Material Selection for Restorative Treatment

Initiating restorative treatment straightway after endodontic therapy is preferable; however, in cases where immediate restoration is not possible, ensuring an adequate restoration is crucial to achieve efficient sealing and prevent contamination (Gonzaga et al., 2011). Consequently, the use of self-cured composite resin has gained attractiveness as an alternative for definitive or intermediary restoration before a crown, aiming to reduce or prevent root canal failure.

## Advantages of Self-Cured Composite Resin

Self-cured chemically adhesive composite resin begins polymerization at the cavity wall, warmed by body temperature, contracting toward the cavity wall, and adhering to it. In contrast, light-cured composite resin polymerizes at the surface via irradiation from above, contracting toward the fast-setting superficial layer, potentially separating from the cavity wall (Fusayama, 1992). The bond strength of adhesive light-cured composite resin is weaker than that of the adhesive self-cured composite resin and weakens over time due to residual stress. Moreover, underpolymerization is possible in deeper layers despite complete superficial layer polymerization due to decreased irradiation intensity and penetration. Given that endodontic accesses are often deeper than 3mm, light-cured resin application can be challenging and may lead to failure and post-treatment sensitivity, which can be addressed by utilizing self-cured composite resin as a definitive restoration

## Structural Integrity and Restoration Choices

Not all endodontically treated teeth require crowns as final restorations if their structural integrity is not compromised. Teeth intact except for the access opening can be adequately restored with composite resin rather than a crown (Baba et al., 2014). In such cases, self-curing composite resin proves beneficial in preventing microleakage, bacteria entry, and root canal failure. These self-curing composite resins, categorized as bulk-fill restorations, can be applied, and polymerized in a single layer, unlike conventional composites, effectively reducing polymerization shrinkage and shrinkage stress. Thus, bulk-fill composites are recommended for deep and narrow cavities deeper than 4 mm, such as endodontic restorations (Lukarcanin et al., 2022). Companies such as SDI, Kuraray, Centrix, Pro-Line, and Alpha-dent offer self-cured composite resins on the market, providing low-stress polymerization, gap-free interface, high compressive and flexural strength, and elimination of the need for acid etching or light curing, thereby minimizing polymerization shrinkage, chair time, and potential failures due to microleakage or bacterial ingress into the canal.

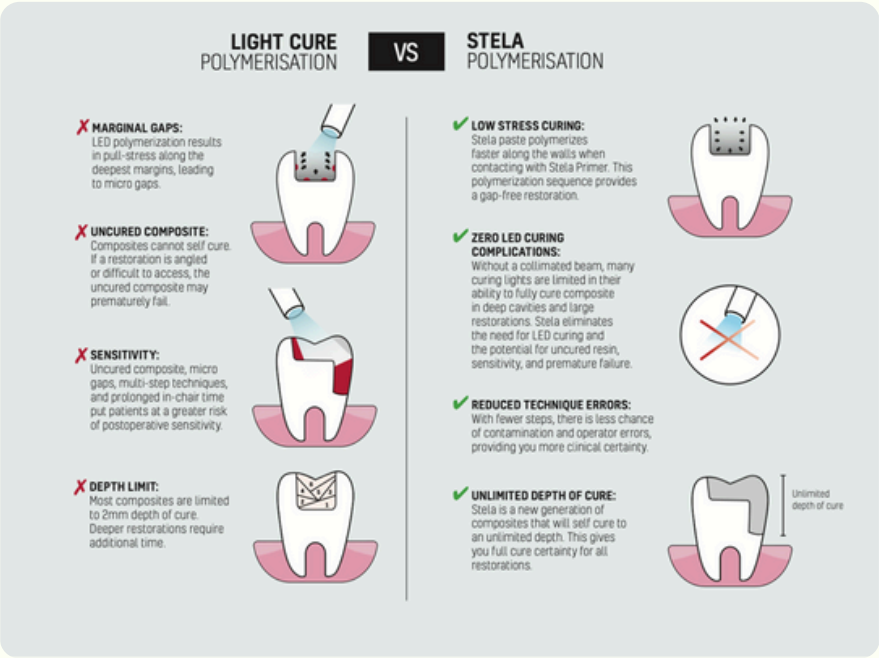


Figure 28: Comparison between light cure and STELA Polymerization. Retrieved from: SDI Stela, 2023.

## Conclusion

Overall, the restoration of endodontically treated teeth is a complex yet crucial aspect of dental practice, encompassing procedures across multiple disciplines. Achieving successful outcomes requires careful consideration of various factors, including the choice of restorative materials and techniques. Acid etching plays a significant role in facilitating composite resin adhesion but must be performed with precision to avoid compromising the integrity of the root canal filling. Utilizing self-cured composite resin offers advantages in terms of ease of application, reduced polymerization shrinkage, and improved sealing properties, especially in deep narrow cavities. By staying up to date of advancements in restorative dentistry and adopting evidence-based practices, dentists can enhance the longevity and success of endodontic treatments, ultimately improving patient outcomes and satisfaction.

## Online Sites of self-cured composite resin suppliers:

- [https://www.sdi.com.au/pdfs/brochures/en-us/stela\\_sdi\\_brochures\\_en-us.pdf](https://www.sdi.com.au/pdfs/brochures/en-us/stela_sdi_brochures_en-us.pdf)
- <https://www.kuraraynoritake.eu/en/clearfil-fii>
- <https://www.centrixdental.com/c-r-hybrid.html>
- <https://usdentaldepot.com/self-cure-comp-kit-15-15g-pro-line-002-012>
- <https://dentaltech.com/product/alpha-dent-self-cure-composite/>

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# Mineral Trioxide Aggregate (MTA) in Endodontics: Properties, Applications, and Clinical Considerations

By: Valeria Delgado, DS III



## Introduction

In endodontics, there are situations like retreatments, fractures, perforations, direct pulp capping, and apexifications that require an aid to regain the internal structure of the canal. Under these conditions, the tooth requires a material that involve bone healing and root repair. Aside from these properties the substance needed would be made with the purpose of improving seal-ability, antimicrobial effect, and biocompatibility of conventional methods of obturation. Bioceramic sealers were developed with these specific characteristics to be in direct contact with living tissue. Endodontic sealers demonstrate the ability to create hydroxyapatite layer when in contact with tissue rich in calcium and phosphate. This bioactive property allows the sealer materials to be very biocompatible, osteoinductive, and osteoconductive while still adding to the sealing abilities (American Association of Endodontists, 2019).

In the 1990s, Mahmoud Torabinejad in California, USA introduced Mineral Trioxide Aggregate (MTA). This is a first-generation bioceramic cement that possesses the properties necessary to support overgrowth of cementum and formation of bone. It is made up of Portland cement and Bismuth oxide. The Portland cement is composed primarily of sintered trioxides of calcium, silica, and alumina with traces of metals and metal oxides. Bismuth oxide is added for radioopacity (American Association of Endodontists, 2019). With this composition, MTA presents excellent biocompatibility and sealing abilities. After a treatment with this material, cases are expected to have improved antibacterial properties, development of an interfacial layer with dentin, and a stable reformation of the periodontium (Terauchi, Torabinejad, Wong, & Bogen, 2024). Its physicochemical properties also present favorable outcomes such as generation of an alkaline pH, phenomenon of intratubular mineralization, and neutralizing. As mentioned before, this cement is well-tolerated when it is in contact with periradicular tissue in case of perforation repairs, apexifications, advanced apical root resorption, and long-standing periapical pathosis (Terauchi, Torabinejad, Wong, & Bogen, 2024).

It can also be used in areas where surgical site is difficult, and the placement of a retrograde filling is tedious. Nonetheless, its composition also demonstrates some drawbacks like its inability to provide a sealer in its purest form due to the traces of metals, ferric oxide, and Bismuth oxide (American Association of Endodontists, 2019). These traces of impurities are argued to create a discoloration in the remaining tooth structure over time, staining the teeth under the restoration and creating failed esthetic. Some studies present that this discoloration does not cause any failure in esthetic or biological results (Terauchi, Torabinejad, Wong, & Bogen, 2024). Its setting time, on the other hand, is high ranging from 3 to 4 hours as compared to its working time of approximately 5 minutes. For this, mixing time is very crucial and the tooth must be infection free for MTA to set adequately (Kadali et al., 2020). This material requires the operator's expertise in the handling properties of this substance to result in an efficient obturation canals.

## Scientific Evidence

Obturation with MTA cement does not ensure a successful treatment but has shown good outcomes in cases for root resorption and open apices. Although this material has been used experimentally for years in endodontics, many scientific investigations have demonstrated many key components MTA demonstrates for specific situations. For instance, one observational study compiled retreatment cases that were treated with MTA. The study presented the challenge the material possesses of preventing the unwanted extrusion of the material in cases with open apices. It exposed cases of underfilled, overfilled, and flush-filled canals with MTA material and the success rates after the treatment. In the overfilled and flush-filled group, it demonstrated a favorable 69%-81% success rate in retreatments made with MTA. On the other hand, the underfilled cases demonstrated the lowest healing rate (69.4%) which required a surgical intervention after 6 months.

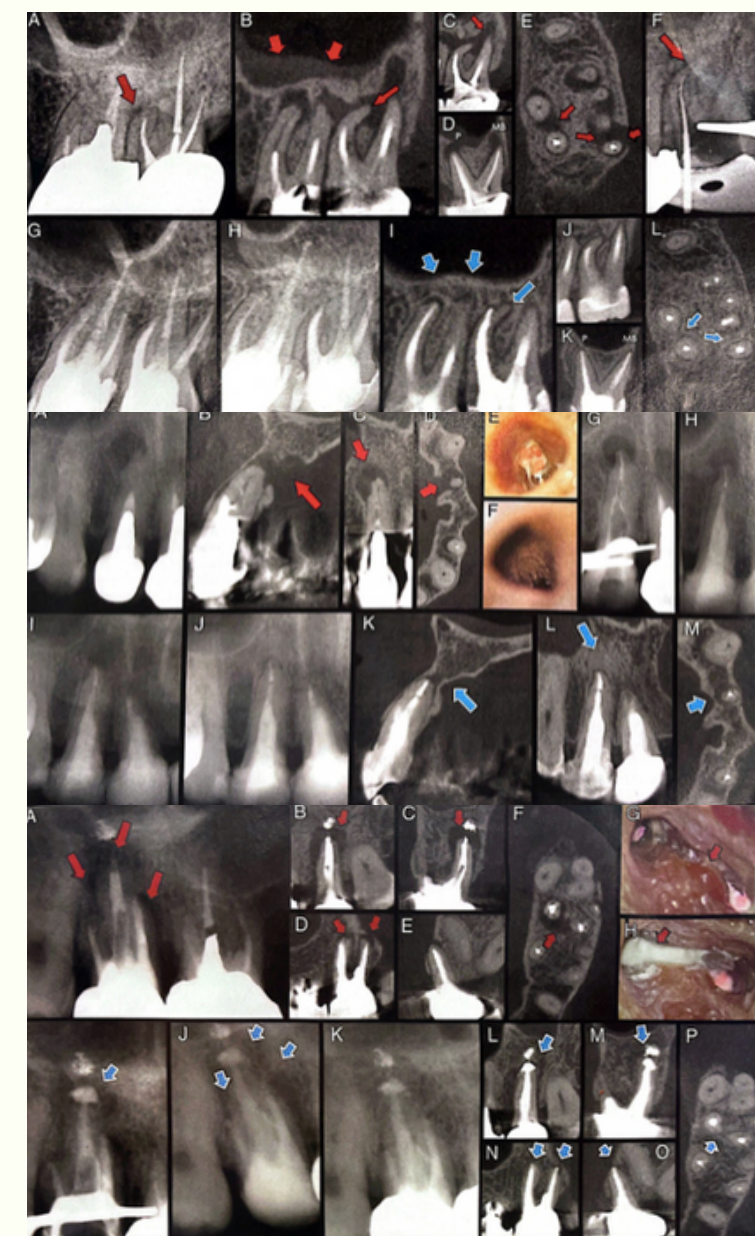
It is worth highlighting, that these were challenging cases that presented ledged, blocked, or calcified canal systems. This retrospective study demonstrated that retreatments with large preoperative lesions were tied to lower healing rates compared to those with smaller periapical lesions. The data supports the concept that more invasive preoperative lesions may be more influential to the healing outcomes than the level of MTA obturation. This study also presents the favorable outcomes observed from the cases may be attributed to the physicochemical properties of MTA (Terauchi, Torabinejad, Wong, & Bogen, 2024).

## Conclusion

Bioceramic sealers have transformed endodontic treatments, with Mineral Trioxide Aggregate (MTA) emerging as a pivotal first-generation option due to its exceptional biocompatibility and sealing capabilities. Despite drawbacks like discoloration and extended setting time, MTA has shown positive outcomes, especially in complex cases involving root resorption and open apices. Ongoing research highlights MTA's role in promoting successful outcomes, underscoring its significance in improving treatment efficacy and patient outcomes. Further studies are needed to address drawbacks and optimize MTA management, paving the way for enhanced treatment results and patient satisfaction in endodontic care.

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**Figure 29:** MTA underfill, flush fill, and underfill, respectively. Pictures present preoperative radiographs, CBCT views, microscope photographs, periapical radiographs, twenty-four-month postoperative radiographs, and twenty-four-month CBCT views of retreatments treated with MTA with underfill, flush fill, and underfill outcomes, respectively. Retrieved from Terauchi, Y; et. al., 2024.



# Management of Avulsed Teeth: Current Best Practices

By: Adrian Suarez, DS III



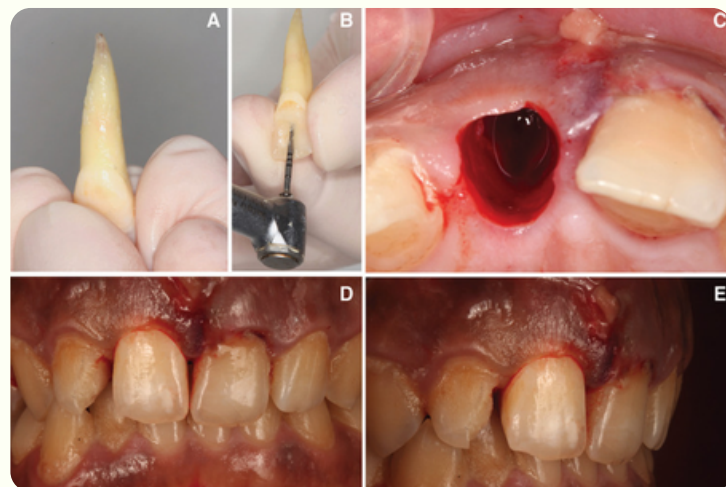
Dental avulsion, characterized by the complete displacement of a tooth from its socket, represents one of the most severe types of dental trauma, even though it only accounts for 0.5-3% of all dental injuries. Tooth avulsion is most common in children and adolescents between the ages of eight and twelve, mainly due to falls, sports injuries, and accidents. Rapid and effective management is critical for the successful replantation and long-term prognosis of avulsed teeth, significantly impacting the likelihood of preventing long-term complications such as root resorption and tooth loss.

## Immediate Management

**Locate the Tooth and Handle with Care:** The avulsed tooth should be located immediately and handled by the crown to prevent damage to the periodontal ligament(PDL) cells on the root surface. Andreasen et al. (1995) demonstrated the importance of PDL cells in the healing process following replantation. Their research indicated that the survival of PDL cells on the root surface is directly correlated with successful reattachment and healing. When PDL cells are preserved, the reimplanted tooth is more likely to integrate into the alveolar bone and achieve functional stability .

**Cleaning the Tooth:** If the tooth is contaminated with debris, it should be gently rinsed with saline or milk. Saline is isotonic and compatible with body tissues, minimizing additional trauma to the PDL cells. Milk is a favorable alternative because it maintains a suitable pH and osmolality, providing a protective environment for the PDL cells. According to the study by Sigalas et al. (2004), "Survival of human periodontal ligament cells in media proposed for transport of avulsed teeth," milk was shown to be an effective medium for preserving PDL cell viability for up to 6 hours. Scrubbing the tooth must be avoided as mechanical forces can destroy the PDL cells, thereby impairing the tooth's potential for reattachment and long-term survival.

**Replantation Timing:** Immediate replantation within 5-10 minutes of avulsion is considered ideal and offers the best prognosis for the avulsed tooth. This recommendation is supported by research indicating the time-sensitive nature of periodontal ligament (PDL) cell survival, which is crucial for successful reattachment of the tooth to its socket. Andreasen and Hjørting-Hansen (1966) provided early evidence on the importance of immediate replantation in their study on tooth replantation. They found that teeth replanted within 15 minutes had better long-term outcomes compared to those replanted after longer periods, highlighting the critical role of timely intervention.



**Figure 30:** A) Avulsed tooth cleaned. B) Extraoral endodontic treatment. Access cavity preparation. C) Socket activated causing bleeding before intentional replantation. D,E) Tooth placed into his socket and splinted temporarily with orthodontic wire. Retrieved from: Bustamante-Hernández, N. (2020).

## Storage Media

If immediate replantation is not possible, storing the avulsed tooth in an appropriate medium becomes crucial to preserve periodontal ligament cell viability.

**Hank's Balanced Salt Solution (HBSS):** Research by Sigalas et al. (2004) has demonstrated that HBSS is the preferred medium due to its optimal preservation properties for periodontal ligament cells.

**Milk:** According to a study by McIntyre et al. (2009), milk is considered a readily available and effective alternative storage medium. Milk has been shown to maintain the viability of periodontal ligament cells for up to 6 hours, as demonstrated by Hammarström et al. (1986).

**Saliva:** Saliva can serve as a last resort storage medium. Although not as effective as HBSS or milk, keeping the avulsed tooth in the patient's mouth, under the tongue, or inside the cheek can help keep it moist. This method helps preserve some viability of periodontal ligament cells, as noted by Sigalas et al. (2004).

## Replantation Technique

**Socket Preparation:** The socket should be carefully inspected and, if necessary, gently rinsed with saline to remove any blood clot. This step helps ensure a clean environment for the replanted tooth, as recommended by Krasner and Rankow (1995).

**Repositioning:** Research by Andersson et al. (1995) highlights the importance of gently repositioning the avulsed tooth into the socket. Proper alignment and positioning are crucial for successful replantation and long-term stability.

**Splinting:** After replantation, a flexible splint should be applied to stabilize the tooth. However, recent studies, such as the one by Trope (2011), suggest that splinting for more than 2 weeks may not improve outcomes and could increase the risk of complications. Therefore, it's essential to follow current guidelines and limit splinting duration to 1-2 weeks.

## Antibiotic Therapy in Dental Avulsion Management

After a dental avulsion, systemic antibiotics are often prescribed to prevent bacterial contamination and subsequent infection. The choice of antibiotic should be guided by the patient's medical history, potential allergies, and considerations regarding dental implications

Research supports the use of antibiotics in preventing infections associated with dental trauma. A study by Flores et al. (2007) evaluated guidelines for the management of traumatic dental injuries and emphasized the importance of antibiotic therapy in preventing complications following avulsion. The study highlighted the need for prompt administration of antibiotics to reduce the risk of infection and improve treatment outcomes.

Regarding the choice of antibiotic, tetracycline has traditionally been recommended due to its broad-spectrum coverage and effectiveness against oral pathogens. However, its use in pediatric patients, especially those under 12 years old, raises concerns about potential teeth discoloration. This is supported by a study conducted by Krasner and Rankow (1995), which discussed the dental implications of tetracycline use in children and adolescents. The study underscored the importance of considering age-specific factors when prescribing antibiotics for dental trauma management.

In light of these considerations, penicillin or amoxicillin is preferred for pediatric patients due to their efficacy and lower risk of dental discoloration. This recommendation aligns with guidelines from the International Association of Dental Traumatology (Andersson et al., 2012), which emphasize the importance of selecting antibiotics that minimize adverse effects on dental health, particularly in young patients.

## Conclusion

The management of avulsed teeth is a time-sensitive and critical process that requires rapid and appropriate action to ensure the best possible outcomes. By adhering to current best practices, including immediate replantation, proper storage media, and appropriate follow-up care, dental professionals can enhance the prognosis for avulsed teeth and reduce the risk of long-term complications.

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# From Pulp to Heart: Chronic Apical Periodontitis and Its Relation to Cardiovascular Disease

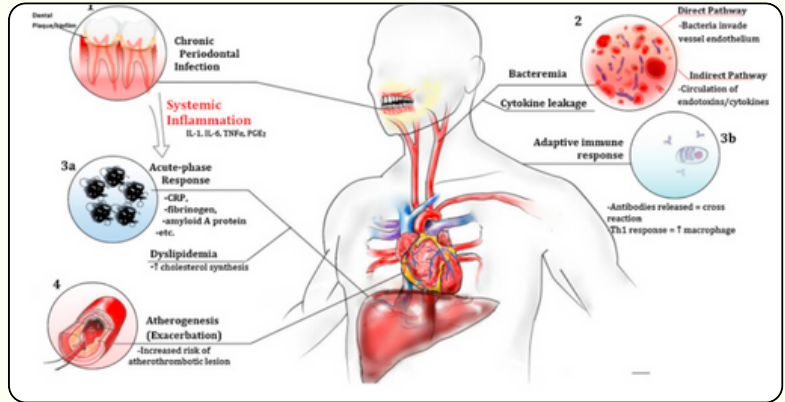
By: Sofia Vega, DS III



Chronic apical periodontitis (CAP) is a persistent inflammatory condition affecting the periapical tissues of a tooth. It typically arises from bacterial invasion and subsequent infection of the dental pulp, often following untreated dental caries or traumatic injury. While CAP primarily affects oral health, emerging evidence suggests a significant association between this localized infection and systemic conditions, notably cardiovascular disease (CVD).

## Pathophysiology of Chronic Apical Periodontitis

CAP occurs when bacteria from an infected tooth pulp spread to the periapical tissues, leading to inflammation and the formation of apical lesions. The body responds with an immune reaction that involves the release of inflammatory cytokines, including interleukins and tumor necrosis factor-alpha (TNF-α). These mediators contribute to the breakdown of periapical bone and persistent infection, despite the body's defensive efforts.



**Figure 31:** Image describes two mechanisms through which periodontal infection can contribute to the development of atherosclerosis (formation of fatty plaques in the arteries). Retrieved from C.M. Nguyen ET AL.

### Indirect Pathway :

1. Bacterial endotoxins and pro-inflammatory cytokines spread through the bloodstream.
2. These substances trigger systemic inflammation, leading to the liver initiating an acute-phase response and releasing various mediators like CRP and fibrinogen.
3. There is also an increase in cholesterol synthesis, disrupting lipid balance.
4. Chemokines from the bacteria attract leukocytes and lymphocytes, initiating immune cell migration and activity.
5. Antibodies are released, and macrophage activity is upregulated.

### Direct Pathway :

1. Bacteria from chronic periodontal infection enter the systemic circulation.
2. These bacteria penetrate the vascular endothelium, causing injury.
3. The injury triggers an inflammatory response, leading to an acute-phase response and dyslipidemia.
4. The adaptive immune system is activated, producing antibodies that can react with the endothelium and LDL, causing more lipids to enter endothelial cells.
5. This immune response also enhances macrophage proliferation and migration

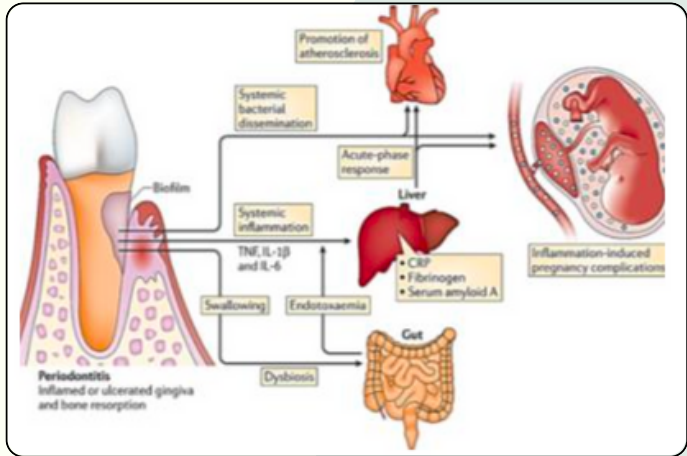
Both pathways result in atherosclerosis and/or the worsening of atherothrombotic lesions, contributing to cardiovascular disease

## Mechanisms Linking CAP to Cardiovascular Disease

The potential link between CAP and CVD is primarily rooted in the systemic effects of chronic inflammation and bacterial dissemination. The mechanisms include:

### • Indirect Pathway:

Chronic infections, such as CAP, can contribute to a systemic inflammatory state. Inflammatory mediators released from apical lesions can enter the bloodstream, leading to endothelial dysfunction and atherosclerosis, which are critical processes in the development of CVD.



**Figure 32:** Image shows the relationship between periodontitis and systemic inflammation. Retrieved from google images.

## Clinical Implications

Understanding the link between CAP and CVD has important clinical implications. It emphasizes the need for:

### • Interdisciplinary Collaboration:

Dentists and physicians should work together to manage patients with chronic oral infections and assess their risk for cardiovascular complications.

### • Preventive Care:

Emphasizing oral hygiene and timely dental care can potentially reduce the incidence of CAP and consequently, the risk of associated systemic diseases.

### • Patient Education:

Patients should be informed about the possible systemic implications of chronic oral infections and the importance of maintaining good oral health to support

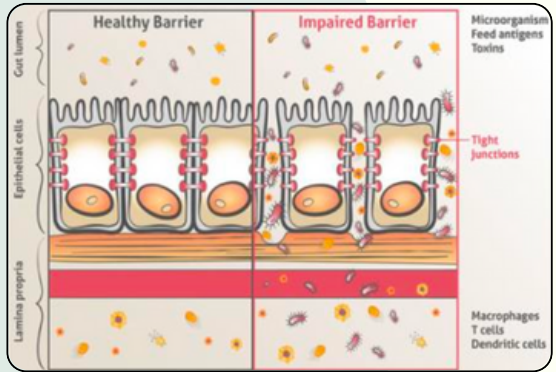
Chronic apical periodontitis is not simply a localized dental issue but a condition with significant implications for systemic health, particularly cardiovascular disease. The evidence linking CAP to CVD highlights the importance of comprehensive healthcare approaches that address both oral and systemic health. Future research should continue to explore these associations to better understand the underlying mechanisms and develop strategies for prevention and management.

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### • Bacterial Translocation:

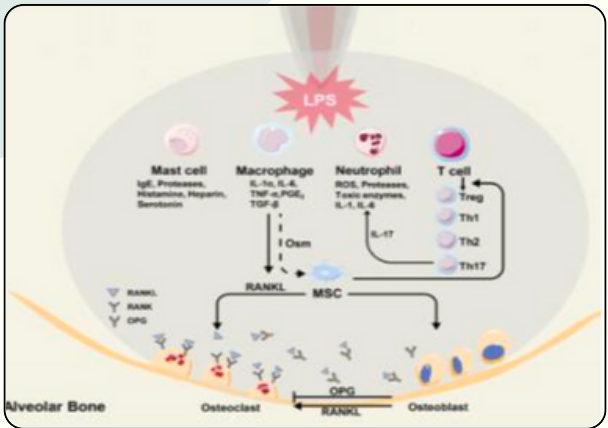
Pathogenic bacteria from apical lesions may translocate into the bloodstream, leading to transient bacteremia. This can directly contribute to the development and exacerbation of atherosclerotic plaques



**Figure 33:** Image shows an example of bacterial translocation in gut. Retrieved from google images.

### • Immune Response

The chronic immune response to persistent infection can lead to the production of autoantibodies and immune complexes, which may damage vascular tissues and promote atherosclerosis.



**Figure 34:** Image shows the immuno- microenvironment in a periapical lesion. Retrieved from Ping Lyu ET AL.

## Evidence of the Association

Research has increasingly focused on exploring the relationship between oral infections and systemic health. A meta-analysis by Amol Ashok Bahekar et al. (2007) highlighted that the prevalence and incidence of coronary heart disease (CHD) are significantly increased in individuals with periodontitis, a condition similar in its chronic inflammatory nature to CAP.

Further evidence was provided by Gregory K An et al. (2016) in their study published in the *Journal of Endodontics*, which investigated the association between radiographically diagnosed apical periodontitis and cardiovascular disease. This hospital records-based study demonstrated a significant correlation between the presence of CAP and the incidence of cardiovascular events. The findings suggest that individuals with CAP are at a higher risk of developing CVD compared to those without the condition.



# Examining the association between Periodontal Disease and Colon Cancer

By: Andrea Capo, DS III

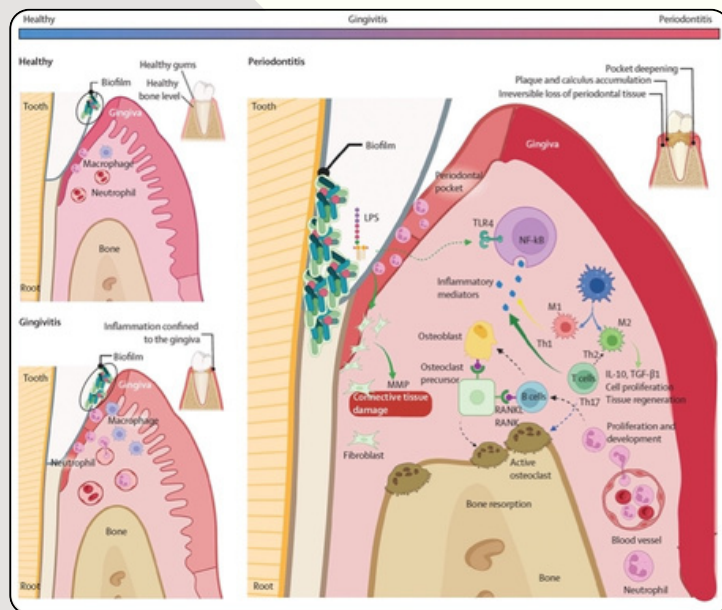


Figure 35: The clinicopathological progression of plaque-induced periodontal diseases. Retrieved from Pai et al., 2023.

Periodontal disease, colloquially known as gum disease, has since been characterized as an inflammatory disease in which there is a progressive destruction of the supporting tissue of the teeth leading to a loss of the attachment apparatus. Periodontal disease has long been associated with many systemic conditions such as, cardiovascular disease, low-weight birth, complications in pregnancy, diabetes, and pulmonary disease (Pihlstrom et al., 2005). The scientific reasoning between these is that inflammation plays a vital role in both periodontal disease and systemic conditions. The underlying mechanism is believed to involve the systemic dissemination of inflammatory mediators, like cytokines and bacterial byproducts from the oral cavity, which can produce or exacerbate inflammation in distant organs and tissues.

## A Global Health Concern

More recently the scientific community has shifted its attention to explore the association between periodontal disease and certain types of cancer. Recent studies have investigated the potential association between periodontal disease and colon cancer, one of the leading causes of cancer-related mortality worldwide. “In the United States, colorectal cancer is the third-leading cause of cancer-related deaths in men and the fourth leading cause in women, but it’s the second most common cause of cancer deaths when numbers for men and women are combined. It’s expected to cause about 53,010 deaths during 2024” (American Cancer Society, 2024, Colorectal Cancer Navigation). While this association is still being investigated, several mechanisms have been proposed. Chronic inflammation is a common feature of both periodontal disease and colon cancer. The inflammatory mediators released in response to periodontal infection may contribute to the initiation and progression of colorectal tumors by promoting cell proliferation, angiogenesis, and genetic mutations (Di Spirito et al., 2020).

## Mechanisms At Play

Periodontal disease can disrupt the balance of the immune system, impairing its ability to detect and eliminate cancerous cells in the colon. This alteration may create a favorable microenvironment for tumor growth and metastasis. A bacterium commonly found in the oral cavity and in abundance in periodontal pockets of patients suffering from periodontal disease, *Fusobacterium nucleatum*, has acquired attention in the context of colorectal cancer due to its presence and potential impact on the tumor microenvironment. Studies have revealed an increase in the abundance of *Fusobacteria* in stool samples obtained from individuals with colorectal cancer compared to those without the disease.

The mechanisms through which *Fusobacteria* affects the tumor immune microenvironment are complex. One proposed mechanism involves *Fusobacteria*'s ability to manipulate the local immune response, potentially suppressing anti-tumor immune activity while promoting conditions favorable for tumor growth by activating transcription of oncogenes. Additionally, *Fusobacteria* may stimulate inflammatory pathways within the tumor microenvironment, further exacerbating chronic inflammation, a known contributor of carcinogenesis.

While observational studies have reported an association between periodontal disease and colon cancer, the strength and uniformity of this association vary among different populations and study designs. A meta-analysis published in 2019 showed an association between Periodontal disease (PD) and increased in Colorectal cancer (CRC) in which patients with PD were more likely to develop CRC than people with good oral health.

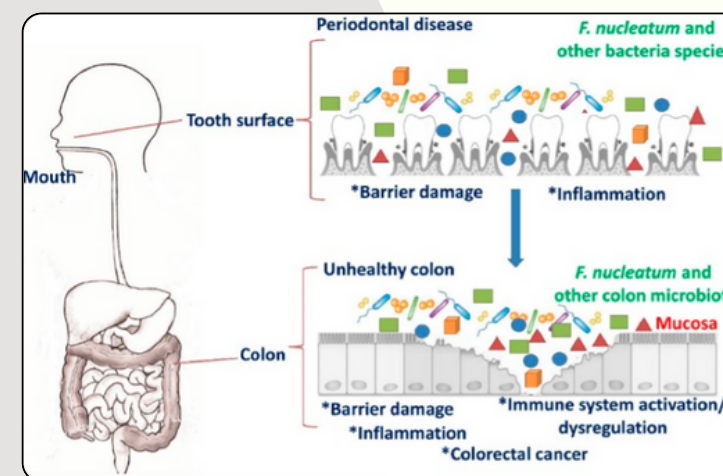


Figure 36: Migration of *F. nucleatum* and other bacterial species from the mouth to the colon. Retrieved from: <https://www.colorectalcanadacanada.com/blog/periodontal-disease-can-be-a-potential-risk-indicator-for-colorectal-cancer/>.

## Towards Comprehensive Health

Recognizing the potential association between periodontal disease and colon cancer has important clinical implications for both dental and medical practitioners. Dentists and periodontists should be vigilant in screening patients for signs of periodontal disease, especially those at higher risk of colon cancer, such as individuals with a family history or predisposing genetic factors. Equally, gastroenterologists and oncologists may consider evaluating the oral health status of patients diagnosed with colon cancer, as addressing periodontal disease could potentially reduce systemic inflammation and improve treatment outcomes. Combined efforts between dental and medical professionals are essential in executing comprehensive care aimed at reducing the burden of both periodontal disease and colon cancer.

While the type of relationship between periodontal disease and colon cancer remains to be fully investigated, emerging evidence suggests a possible bidirectional association mediated by chronic inflammation and immune dysbiosis. Further research is needed to better understand these mechanisms and to develop targeted strategies for prevention and management. In the meantime, maintaining good oral hygiene and seeking regular dental care are sensible measures that may not only preserve dental health but also contribute to overall well-being and potentially reduce the risk of systemic diseases, including colon cancer.

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# Understanding the Connection Between Periodontal Disease and Squamous Cell Carcinoma: A Detailed Exploration

## Introduction

In the world of oral health there are two major problems that present a concern among health professionals: periodontal disease, commonly known as gum disease, and oral squamous cell carcinoma (OSCC). These irregularities present several distinctive manifestations of each one and these are expressed if they are not treated in time. When dental plaque accumulates along the gum line the body develops inflammation, redness, and bleeding. These signs is the body letting us know that there is an imbalance in the oral health, also known as gingivitis. When this point is reached, there is still time to take action and reverse it, if no action is taken it can develop periodontitis. Periodontitis is when there is loss of the periodontal ligament and alveolar bone and once reached this point there is no turning back. It is important to note that factors like smoking can exacerbate the process and influence its further progression. Once the process is aggravated, it may become systemic and eventually give way to cardiovascular diseases, diabetes, among others. On the other hand, the major type of cancer that prevails in the oral cavity is squamous cell carcinoma. Normally, this kind of cancer is caused by precancerous lesions, such as exposure to tobacco, infection from HPV; ulcers appear that are explained as discomfort.

## How our body react to Periodontal disease

For any type of periodontal disease to develop, bacteria have to have a favorable environment to take advantage of this event. When the imbalance occurs, our immune system is activated, creating a series of events that contribute to counteracting the opportunistic event of the bacteria. Once the immune system recognizes the threat it begins to act, the adaptive immune system uses CD4 + T-cells to manage the imbalance created by the bacteria. Using the CD4 + T-cells, it begins to regulate the balance of osteoblasts (bone forming) and osteoclasts (bone resorption) influenced by the immune and endocrine system. Nevertheless, the cytokines and the inflammatory mediators produced by immune cells drive periodontal breakdown and collagen destruction (Figure 36), shaping the progression of periodontitis, which is influenced by various behavioral, environmental, and genetic factors.

By: Jayminael Centeno, DS I



## How our body react to Periodontal disease

When we talk about oral squamous cell carcinoma, we must keep in mind that it presents many complications and challenges for people who suffer from it. These complications sometimes impede the vital functionality of speaking, swallowing, and taste perception. Scientists have realized that carcinoma often begins to develop when we are exposed for a constant period to risk factors such as tobacco, alcohol, or HPV (Figure 39). The oncogenic process of carcinoma involves a series of mutations and epigenetic modifications such as DNA methylation and histone modifications. Oncogenes can be activated, and tumor suppressors inactivated, this way cell replication does not stop and causes cancer cells to progress, favoring the tumor. There are factors that contribute to tumor progression, for example epidermal growth factor and endothelial growth factor that create an inflation of cytokines, thus promoting invasion and metastasis. Y. Tan study mention that 80% - 90% of head and neck squamous cell carcinoma is found to overexpressed epidermal growth factors receptors (Y. Tan et al 2023). By understanding these mechanisms, we can be more aware of how these mutations and genetic variations behave in order to be able to attack them in a correct and effective way and know what treatment to use.

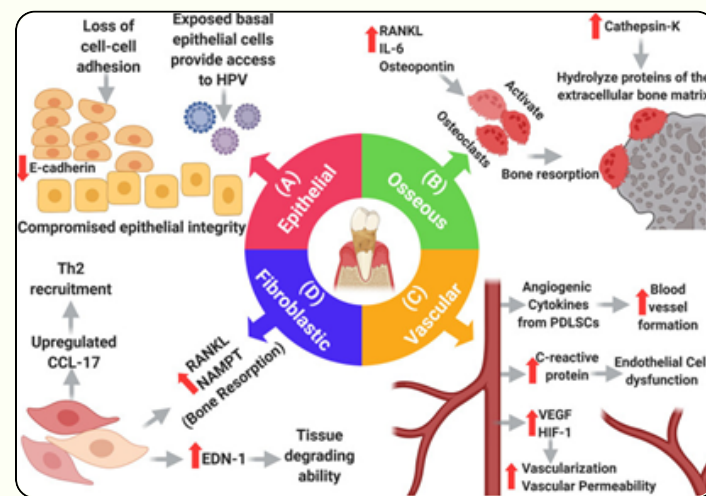


Figure 37: Illustration shows alterations in the different cells of the periodontium. Retrieved from One Health 2020.

## Bridge between Periodontal disease and Squamous cell carcinoma

The relationship between periodontal diseases and oral squamous cell carcinoma has been studied for many years now, and no doubt, it is complex and multidimensional in nature. No direct relationship has been discovered between the two; however, factors exist that contribute to each other. O. Elebyary study mention that the association between periodontal disease and oral squamous cell carcinoma may be reciprocal or bidirectional. This means that oral squamous cell carcinoma can contribute and/or worsening periodontal disease, and vice versa (O. Elebyary et al. 2021). People with periodontitis can fuel tumor development through a variety of mechanisms, like the generation of free radicals and genetic mutations. For example, products of inflammatory cells can create an ideal environment that exacerbates tissue damage, perpetuating the cycle of inflammation. An example could be periodontal pathogens exposure (Figure 38), which can lead to the downregulation of E-cadherin. This transition from benign to aggressive, metastasis-prone carcinomas is marked by a reduction of E-cadherin and therefore forms a hallmark of the epithelial-mesenchymal transition process in oral squamous cell carcinoma. However, with new epidemiological studies in search of the relationship between the oral microbiome, periodontal pathogens, and cancer risk, comes the light into possible preventive strategies.

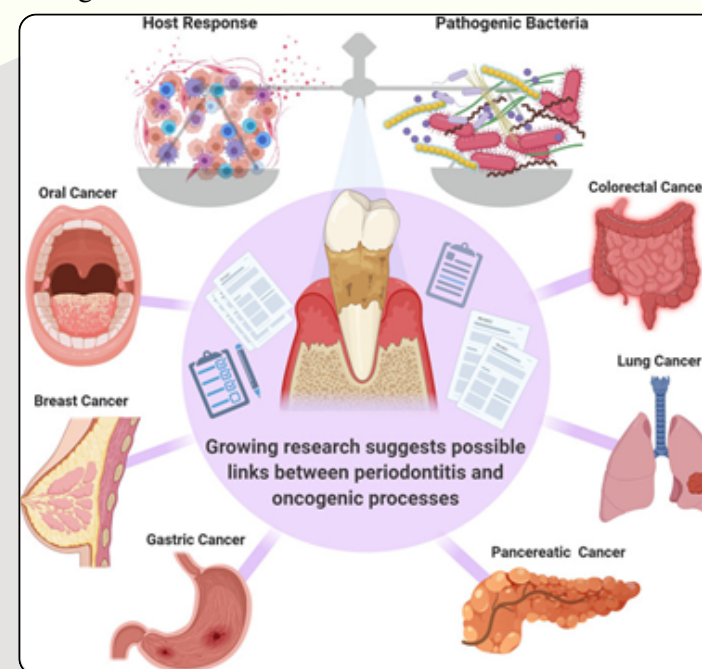


Figure 38: The equilibrium between host immune system and pathogenic bacteria determine the state of health. Retrieved from Oral Health, 2020.

## Conclusion

The association between periodontal disorders and OSCC reflects the complex interplay between bacterial pathogens, cellular alterations, and chronic inflammation of the oral microenvironment. Periodontal inflammation compromises tissue integrity, which is characterized by entry of pathogenic microorganisms and breakdown of the epithelial barrier. Important molecular changes pointing to a shift from benign to aggressive, metastasis-prone carcinomas include E-cadherin downregulation, driven by inflammatory cytokines such as TNF- $\alpha$ . This, therefore, highlights the role of epithelial-mesenchymal transition in OSCC formation. Comprehending these molecular connections provides significant understanding of the etiology of mouth cancer and highlights the significance of periodontal health in cancer preventive tactics. Thus, effective treatment and prevention of periodontal diseases could provide a possible path.

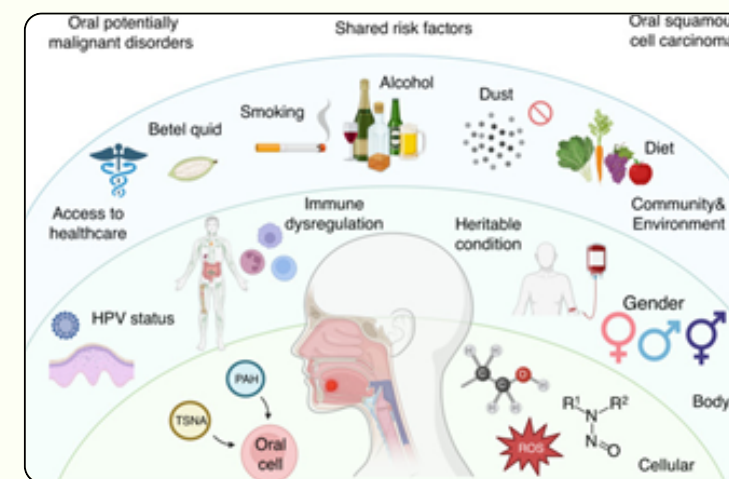


Figure 39: Image show some of the risk factors of oral squamous cell carcinoma Retrieved from Int J Oral Sci. 2023

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# Bridging the Gap: Oral Health's Role in Respiratory Infections, with a Focus on Periodontitis and COVID-19

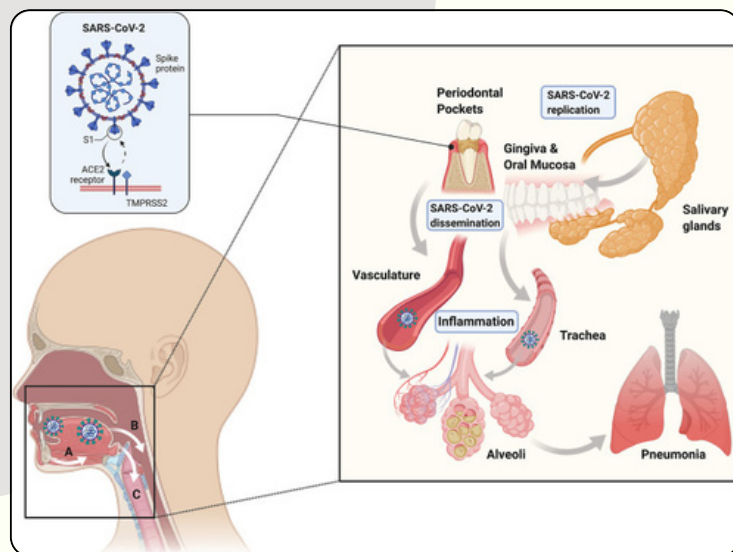
By: Monica Cintron, DS I



## Introduction

The alveolar bone, gingiva, cementum, and its ligaments are just a few of the tissues that are severely damaged by periodontitis, a chronic inflammatory disease that is irreversible. It's fueled by an imbalance between our bodies and the microbes in our mouths. In general 42.2% of individuals in the United States ages 30 and over had complete periodontitis, with 7.8% suffering severe periodontitis and 34.4% experiencing nonsevere periodontitis. Increasing age was associated with an increased incidence of periodontitis (Eke, PI., 2018).

The prevalence of periodontitis and its link to other health issues like respiratory infections have drawn increasing attention. The purpose of this narrative review is to shed light on the relationships between COVID-19 and periodontitis. There is growing interest in the relationship and potential reciprocal links between the oral cavity periodontitis virus and COVID-19 as droplet transmission is the mode of transmission used for dissemination



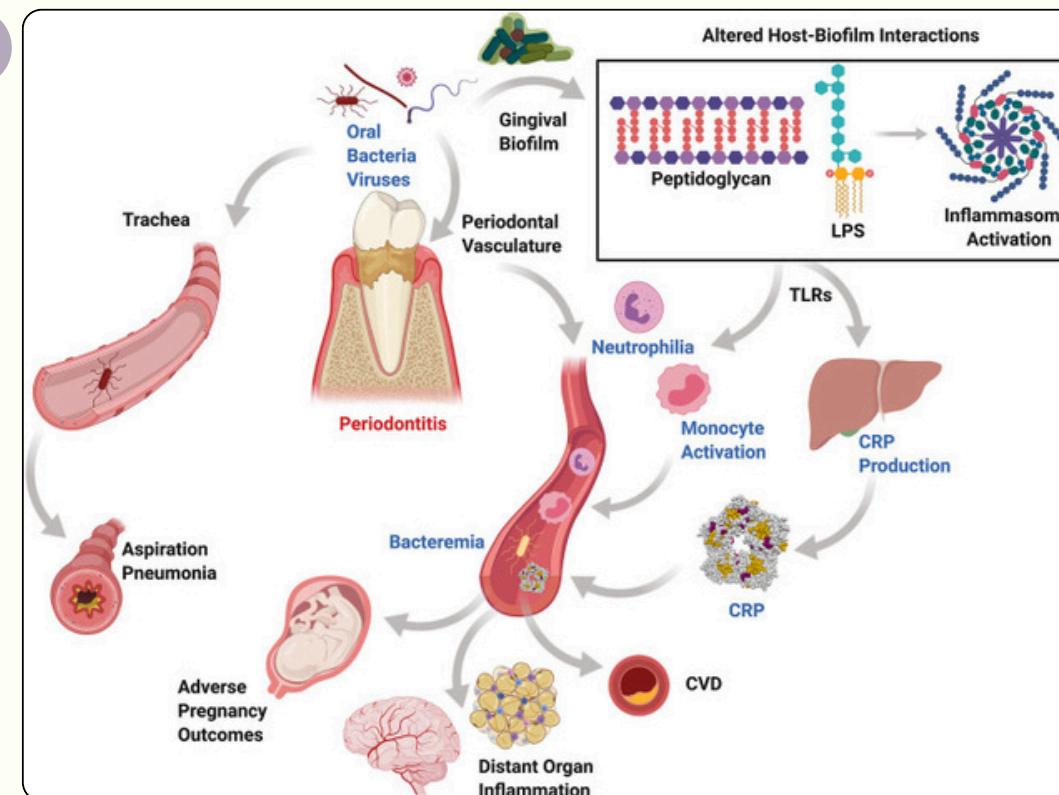
**Figure 40:** mechanisms of periodontal-covid-19 connections. Retrieved from Brock, M. 2022.

## Considerations

Periodontitis influences the onset and course of a variety of non-oral systemic illnesses, in which patients and health-care professionals frequently underestimate it (the severity of periodontal disease). Furthermore, in a patient with periodontitis, the periodontal pockets' whole surface area has been reported to be nearly as big as the size of a human palm. This is regarded as a significant inflammatory area that, if it were anywhere else on the body, would require immediate medical attention (Brock, M. 2022). There are two main pathways in which periodontal infections harbor pathogens and contribute to illnesses, directly and indirectly, both of which occur at the same time. (Figure 41). The indirect pathway may be fueled by bacterial metabolites and the host's inflammatory immunological response to periodontal infection. While the direct pathway involves the infiltration of pathogens into the systemic circulation via the lining of the periodontal pocket leading to bacteremia and microbe dissemination.

## Covid-19

Taste receptor cells (TRC) which are located on the tongue harbor ACE2 receptors which are the primary binding sites for SARS-CoV-2. Additionally, TRC I, the supporting cells neighboring TRCs, also express ACE2 receptors, rendering them susceptible to infection. Disruption of these supportive cells can lead to the demise of nearby TRCs, however, this method of viral entry into TRCs represents just one possible route for pathogens to access the oral cavity. Furthermore, droplet PCR tests of the virus have been identified primarily in the minor salivary glands. This implies that the virus can proliferate and persist in saliva, facilitating its transmission to others and throughout the body. Moreover, the quantity of virus in saliva has been found to correlate with the presence of viral symptoms (Brock, M., 2022).



**Figure 41:** Mechanisms of periodontal system connections. Retrieved from Brock, M. 2022.

## Periodontitis

The detection of replicating SARS-CoV-2 in oral tissues implies that the oral cavity could serve as a reservoir for the virus, given its propensity to bind to ACE2 receptors in this context, aiding host entrance (Figure 40). This suggests that maintaining good oral health may help prevent respiratory infections by lowering viral loads and slowing illness spread. Periodontal disease and a number of respiratory conditions have been related, according to investigations. It is proposed that inflammatory cytokines are potentially released in response to microorganisms related to periodontal disease. This pathway could be playing a role in the influx of cytokines and acute respiratory distress syndrome which COVID-19 patients can experience. Such outcomes indicate how oral hygiene and dental care may help in fighting the infection caused by SARS-CoV-2 (Brock, M., 2022).

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# From Consultation to Prevention: A Pharmacist's Role in Healthcare and Oral Hygiene

By: Nataly A. Delgado Hernández  
1st year Pharmacy Student



## A Pharmacists Role

Pharmacists serve as indispensable members of the healthcare team, providing a vital link between patients and their medications. Pharmacists offer patient education, ensuring that medications are administered safely and effectively. They play a significant role in monitoring patient health and managing chronic conditions contributing to the overall well-being and optimal clinical health results of the community. In addition to being allies for patients, pharmacists are also of great importance to fellow doctors in the healthcare field, providing consultations, interprofessional collaboration and education about medications. Pharmacists are one of the most accessible healthcare professionals for the public and any healthcare personnel.

## Drug Related Problems

A particularly crucial aspect of their role is the prevention and identification of drug-related problems (DRPs), such as adverse reactions, ineffectiveness, incorrect dosage, poor adherence and drug interactions. Some common drug interactions that dental professionals encounter include NSAIDs with antihypertensives, antidepressants with sedatives, vasoconstrictors with nonselective b-adrenergic blocking drugs, amongst others. Since pharmacology and pharmacotherapeutics is generally limited in dental training, pharmacists can provide their expertise and work with dentist to comprehensively identify and address drug interactions. Through meticulous review of medication regimens and close collaboration with other healthcare professionals, pharmacists help minimize risks and enhance therapeutic outcomes, making them an essential piece in patient safety and optimization of their pharmacotherapy and healthcare.

Pharmacists play a crucial role in identifying and preventing DRPs significantly impacting oral health and hygiene. Medications are essential for treatment and overall healthcare, however they often present distinct side effects that may be unknown to patients and other providers leading to secondary pathologies.

## DRPs impacting oral health

For instance, xerostomia, edentulism, tooth loss, and periodontal disease are common dental conditions, especially amongst the elderly, that are worsened or caused by the patient's pharmacotherapy.

In terms of xerostomia, drugs such as antidepressants, antipsychotics, and anxiolytics can cause anticholinergic effects arising from deactivation of M3 muscarinic receptors, which produce profound stimulation of the salivary glands. Since saliva aids in digestion, protection against oral infections and maintenance of oral pH, protecting against tooth erosion and cavities, its decrease will lead to poorer oral health outcomes. Pharmacists' orientation on the correct use of these drugs and proper care during their administration could prevent and minimize the risk the progression of xerostomia to tooth decay and gum disease.

Another significant oral health concern is medication induced gingival hyperplasia, aiding bacterial proliferation and harm to neighboring oral structures. Chronic use of drugs like anticonvulsants such as Phenytoin, cyclosporine and calcium channel blockers like Amlodipine for hypertension can lead to this condition. Pharmaceutical intervention and education for patients utilizing these drugs would prevent the development of this disease and its progression to a serious periodontal disease.

Oral thrush, caused by candida albicans, can be triggered by certain medications like antibiotics that disturb oral bacterial balance, inhaled corticosteroids, and some chemotherapy drugs that weaken the immune system. This yeast infection could become a systemic infection that threatens the well-being of immunocompromised patients. Pharmacists are accessible healthcare providers who can educate patients to prevent these effects. They can also recognize signs and symptoms if they appear to seek early medical attention, recommend probiotics or antifungal medication to restore bacterial balance, and consult prescribers if they identify a patient at risk.

## Conclusion

Pharmacists' expertise is essential in recognizing potential side effects and advising patients on how to mitigate them. By reviewing medication regimens and collaborating closely with dentists, pharmacists help manage and prevent oral health diseases. This is one of the many reasons that partnership and interprofessional collaboration between pharmacists and dentists are crucial. Dentists need to be informed about all medications a patient is taking, including over-the-counter products and supplements, to provide comprehensive dental care. This collaboration ensures that any oral side effects of medications are promptly addressed, enhancing patient safety and optimizing both dental and overall outcomes. Together, pharmacists and dentists can provide an integral care that addresses the synergy of medication management and oral health, playing a vital role in maintaining the patient's well-being and preventing DRPs.

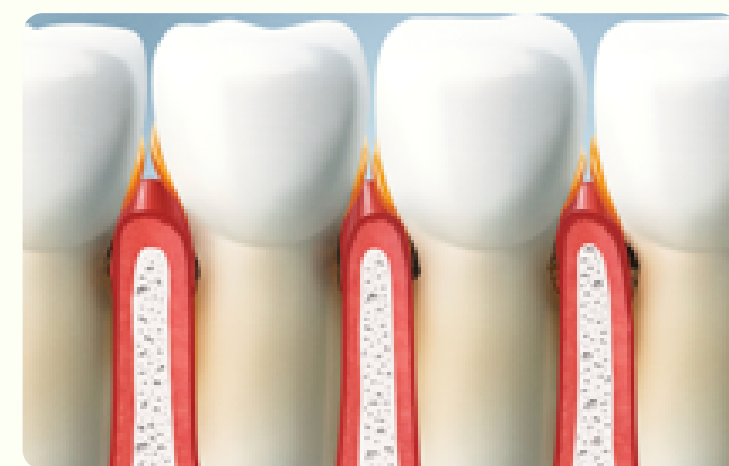


Figure 42: Gingival Overgrowth. Retrieved from Zavahi, T. (2022).

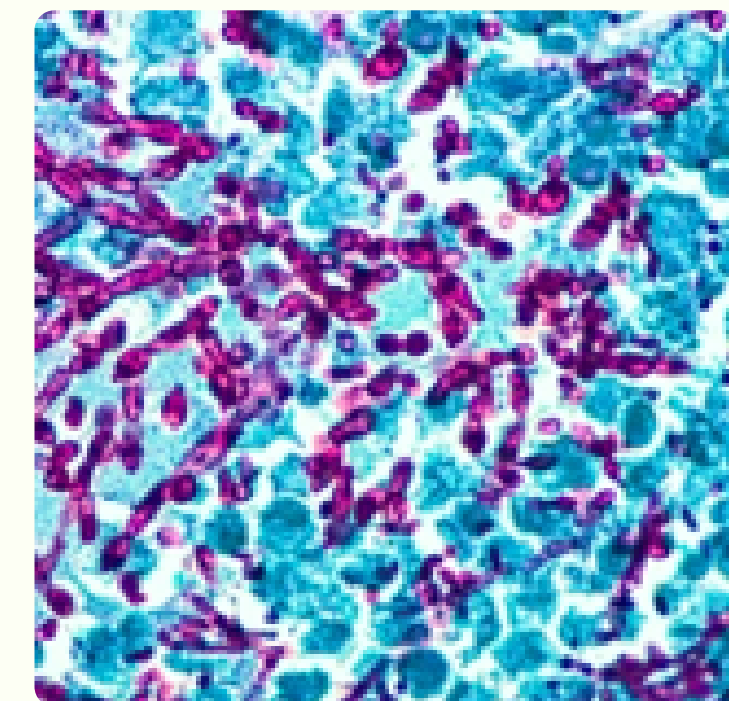


Figure 43: Microscopic image of Candida. Retrieved from National Library of Medicine. (2022).

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# The Journey of Pregnancy: Comprehensive Care and Addressing Oral Clefts

By: Edgardo A. Rodriguez  
3rd year Medical Student



## The Role of Ultrasound in Prenatal Care

Pregnancy, one of the most important and fascinating biological processes that makes life possible. Pregnancy is composed of a series of hormonal, physiological and anatomical changes in a woman’s body as the embryo develops, eventually being termed a fetus after 8 weeks of development until birth, when it is called a neonate. During pregnancy, it is essential to maintain the focus on your most important patient the mother while also ensuring the fetus well-being. To achieve this, numerous screening laboratories and guidelines are followed, along with routine prenatal imaging. The American College of Obstetrics and Gynecology has recommended ultrasound as the chosen examination for all pregnant patients, it is minimally invasive and pose no harm to the fetus. Usually, a first trimester ultrasound is used to estimate gestational age and assess for complications like ectopic pregnancy. Later, a second trimester ultrasound is performed between 18-22 weeks of gestation to assess fetal anatomy (Obstetrics & Gynecology, 2016). While this imaging modality may not be the most sensitive, it plays an important role in guiding medical decisions.



Figure 44: Example of a second trimester ultrasound.  
Retrieved from Alhusseiny, K., 2023

The ultrasound is defined as sound of a frequency above the human audible range, above 20Khz, but for medical applications frequencies are from 1-15 Mhz (million cycles per second). When these waves encounter interfaces within the body, returning echoes are detected by the transducer, allowing calculation of depth and construction of two-dimensional images based on the pulse-echo principle(Venables, 2011).

## Oral Cleft: The Most Common Craniofacial Malformation

Oral cleft, the most common craniofacial congenital malformation, includes both cleft lip and cleft palate. These embryological anomalies can occur together or separately, arising from similar developmental mechanisms. There are three primary types of oral cleft: cleft lip alone, cleft palate alone, or cleft lip with cleft palate. In the United States, according to the National Birth Defects Prevention Network annual data report the prevalence stands at 10 per 10,000 births, with cleft lip alone at 3.56 per 10,000 live births, cleft lip with cleft palate at 6.40 per 10,000 births, and cleft palate at 5.93 per 10,000 live births (Mai, C. T., 2019). Oral cleft manifest when the tissues forming the lips or palate fail to fully fuse during fetal development, resulting in a gap or opening. While the exact mechanism remains unclear, certain prenatal risk factors increase the likelihood of their occurrence. Genetics plays a significant role, alongside maternal factors such as smoking, obesity, advanced maternal age, environmental toxins and alcohol consumption during pregnancy. The process of midface development involves a cascade of genes regulating cell signaling, communication, differentiation, and movement, with the SHH gene being one of the most studied.

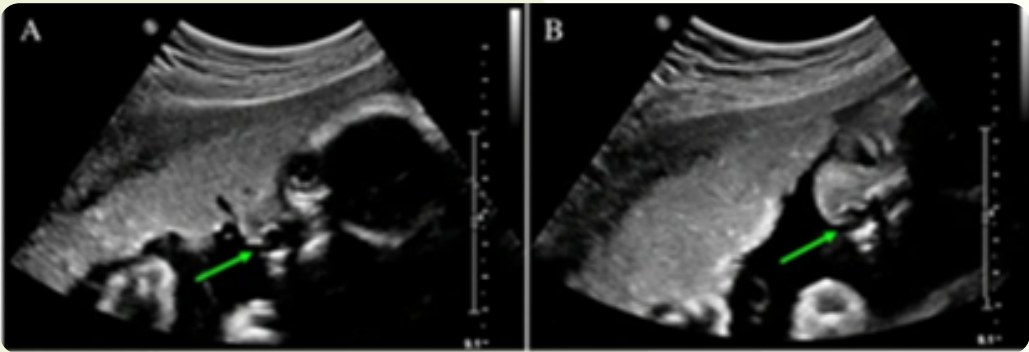


Figure 45: Transabdominal ultrasound of a 26 weeks' gestation. Arrows indicate cleft palate site. Retrieved from Kim, D., 2015.

Environmental factors linked to oral clefts have been extensively researched in animals, with teratogen exposure thought to contribute to malformations in humans, particularly in those with susceptible genetic profiles. Folate antagonists, including certain seizure medications like Phenytoin, carbamazepine, valproate, topiramate are among the drugs pregnant women should avoid due to their association with oral clefts. Most reproductive-aged female are recommended to take a daily multivitamin containing at least 0.4 mg of folic acid starting one month before conception aiming to lower the risk of neural tube defects and potentially other congenital anomalies, but the role of folate in the etiology of oral cleft is controversial. Smoking cessation is strongly advised during pregnancy, as smoking is not only detrimental to fetal health but also linked to cleft lip and palate (Zhou, 2020).

## Prenatal Diagnosis and Management of Oral Clefts

Prenatal diagnosis plays a crucial role in managing oral cleft malformations. Obstetricians conduct prenatal ultrasounds between 11 to 14 weeks of gestation to screen for anomalies. In the second trimester, fetal ultrasounds are performed to visualize the upper lip and palate, with careful examination for palate involvement if cleft lip is detected. While cleft palate alone is less commonly identified prenatally, early detection facilitates syndrome identification, as syndromes account for up to 50% of cases of cleft palate. Genetic testing may be recommended for patients with oral clefts to identify common chromosomal trisomy. Early diagnosis enables parents to make informed decisions, prepare for their child's needs, and seek appropriate medical care. Referral to a multidisciplinary team comprising specialists in pediatrics, genetics, nursing, nutrition, surgery, dentistry, psychology, and speech pathology is essential for comprehensive management (Li, 2023).

## Conclusion

In conclusion, understanding the causes, prevalence, and prenatal diagnosis of oral clefts is crucial in providing optimal care and support to affected individuals and their families. By raising awareness and promoting collaboration among healthcare professionals, we can ensure early detection, intervention, and holistic management of these congenital anomalies.

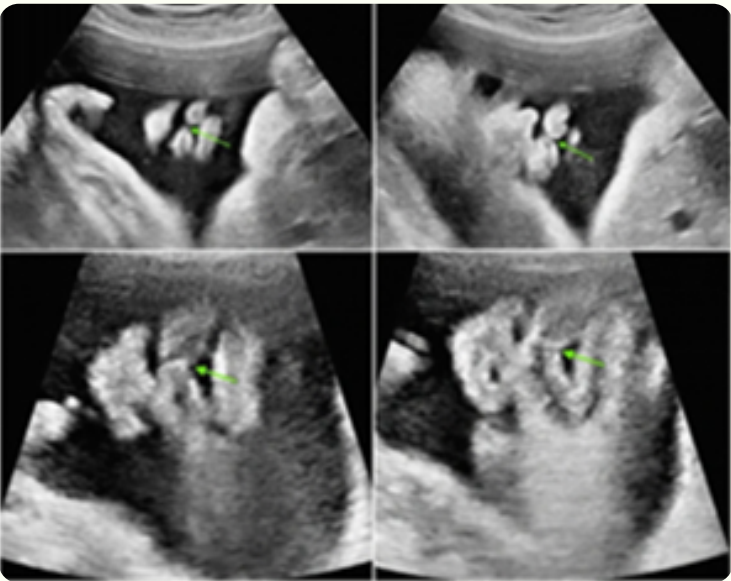


Figure 46: Transabdominal ultrasound of a 35 weeks gestation. Arrows indicate cleft lip site. Retrieved from Kim, D., 2015.

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# Dust Hazards in Dentistry: Effects on Dentists and Technicians and the Need for More Research on Silica

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1st year MS Public Health



## Understanding Dental Dust Hazards

When we think of dust, we often imagine common allergens, but dust comprises a collection of microscopic particles that can be both visible and airborne. In the dental workplace, dust can contain a variety of hazardous substances, including heavy metals such as cobalt, chromium, and molybdenum, silica, gypsum, polymethyl methacrylate (PMMA), dental alginate, vitallium, and porcelain. Each of these materials, when present in excess, possess significant health risks. Industrial hygienists play a crucial role in managing and mitigating these hazards. While the effects of many of these particles on dentists and dental technicians have been studied, the specific impact of silica dust has not received the required attention in the literature. This article focuses on dental dust, silica and the risk of silicosis in the dental profession.

## Research on Dental Dust

Research has shown that oral health care workers are at risk of developing various conditions due to exposure to dental dust. For instance, a study by Wei Wang found that dust particles released during the grinding of dental prostheses could induce cytotoxicity in macrophages, indicating potential harm to the immune system and respiratory health (Wang, W., 2020). Similarly, Zhang et al. demonstrated that animals exposed to a mixture of dust from dental prostheses, such as vitallium, porcelain, and PMMA, developed lung fibrosis, underscoring the pulmonary hazards associated with dental dust exposure (Zhang ZY., 2005). Furthermore, research by Upadhyay revealed that rats exposed to fine dust exhibited increased levels of inflammatory cells and Interleukin-6, suggesting a heightened inflammatory response in the respiratory tract (Upadhyay, S. 2010). These studies, among others, highlight the significant impact of different dust particles on the human body and underscore the high risk faced by dental professionals.

## Silica Exposure in Dental Practice

In order to talk about silica, we first need to understand what it is and where it can be found in the dental setting. Silica is naturally present in the environment and is categorized into two main types: crystalline silica and amorphous (non-crystalline) silica (CDC, 2020). In dentistry, silica is commonly found in materials such as acrylic fillings and toothpaste. Additionally, dental professionals may encounter silica during tasks like casting, sandblasting, porcelain grinding, and other laboratory procedures. However, there is limited literature on silica exposure in the dental profession, with most information dating back to the early 2000s, supplemented by various case reports. For example, in an article published by the CDC, nine cases of silicosis were reported across different states, all of which were linked to individuals working in dental laboratories (CDC, 2004). Additionally, a case report by S. Iannello described a 28-year-old female dental technician diagnosed with rheumatoid syndrome and lung interstitial disorder, attributed to silica exposure from dental ceramic products. Upon implementing proper protective measures, her symptoms resolved (Iannello, S., 2002). Similarly, another case report detailed a 58-year-old female dental technician who presented with chest discomfort and was subsequently diagnosed with pulmonary amyloidosis (Figure 48). Analysis revealed silica deposition in the pulmonary tissue, leading to a diagnosis of pulmonary granulomas with amyloid deposition due to chronic silica exposure (Hirano, T., 2018). These cases underscore the significant health risks associated with silica exposure in the dental workplace and emphasize the importance of implementing preventive measures. Further research focused on this topic is crucial for better understanding and addressing the risks posed by silica dust in dental settings.

## Understanding Dental Dust Hazards

In conclusion, while case reports have highlighted occurrences of silicosis among dental technicians, there remains a critical need for further research to thoroughly investigate the correlation between silica exposure and its impact on the dental profession. Specifically, more comprehensive studies are necessary to elucidate the extent of silica-related health risks faced by dental professionals, including dentists. It is essential to explore potential long-term health implications for dentists, as they are also exposed to dental dust containing silica particles during various procedures. By conducting rigorous studies focused on both dental technicians and dentists, we can gain a deeper understanding of the risks associated with silica exposure in the dental workplace. This knowledge is crucial for implementing effective preventive measures and ensuring the health and safety of all individuals within the dental profession.



Figure 47: Relative size particle of Respirable Crystalline Silica compared to other particles ranging from 0.045  $\mu\text{m}$  to 180  $\mu\text{m}$ . Retrieved from Ang, C., 2020.

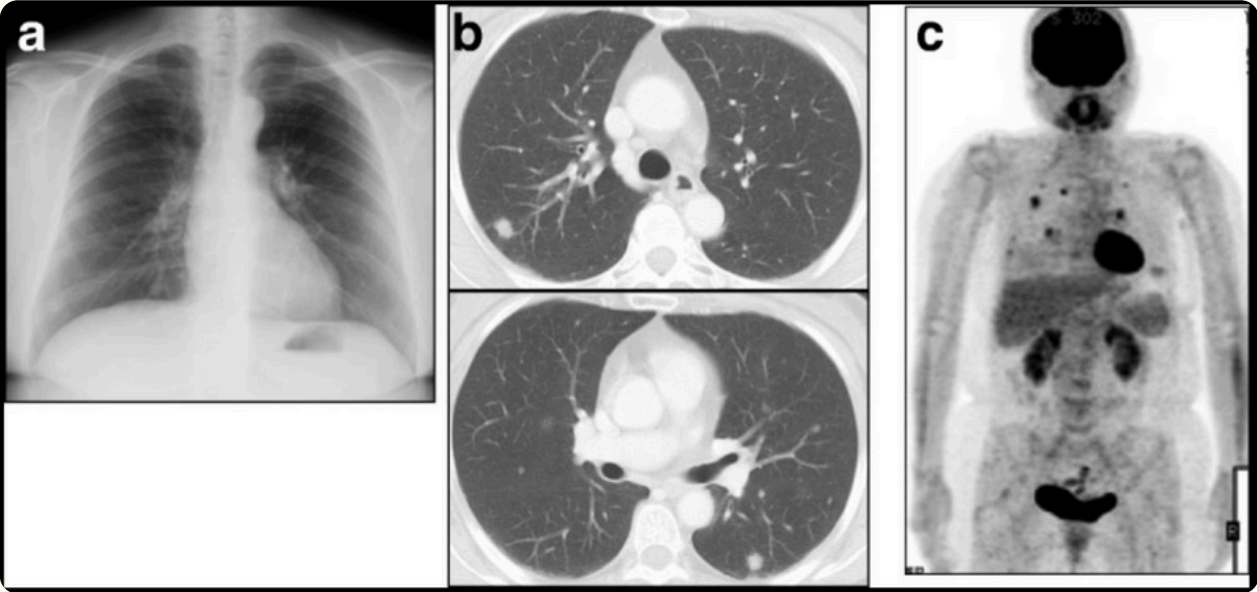


Figure 48: Patient diagnose with pulmonary *granulomas with amyloid deposition caused by chronic silica exposure*. Image a, b Chest X ray (a) and chest computed tomography on admission (b) revealed multiple well-defined nodules in both lungs. c Fluorodeoxyglucose (FDG)-positron emission tomography revealed abnormal FDG uptake in the same lesions with a maximal standardized uptake value (SUV [max]) of 5.6. Retrieved from Hirano, T., 2018

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**Dr. Lydia Lopez**



We want to extend our heartfelt gratitude to our esteemed mentor. Without her unwavering dedication and guidance, the association would not be what it is today. Her relentless pursuit of excellence and her willingness to help in any circumstance have been truly inspirational. She undoubtedly deserves to have the association named in her honor, as a testament to her significant contributions and the profound impact she has had on all of us.



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## **Cover Photo: Portal to Odontology by Dr. José M. Saldaña**

He was born in Santurce, Puerto Rico on May 6, 1939. He graduated from the School of Dentistry in 1962 with the degree of Doctor of Dental Medicine, from the University of Puerto Rico. In 1968 he obtained a Master's degree in Public Health from the School of Public Health of the same University. That year he joined the Faculty of Dentistry as a professor. During his successful academic career he held the highest positions of university leadership, having been Dean of the School of Public Health from 1973-76. He was rector of the Medical Sciences Campus from 1985-90 and President of the University of Puerto Rico from 1990-94. He takes advantage of the retirement and maintains his private office in Gallery of Walks in Río Piedras.

Since he was a child he showed great ability to draw, which led him to take drawing and caricature classes with Enver Azizi. Later he took drawing and painting classes with teacher Alejandro Sánchez Felipe and then watercolor studies with renowned international artists such as Robert Wade, Tony Couch and Alvaro Castagnet. Finally, he leaned towards watercolor where he currently stands out in that medium.

His works consist mainly of landscapes, typical prints of our fields, beaches and towns. His paintings demonstrate a mastery of drawing technique and a strong inclination for bright colors, lights and shadows. His works are exhibited in galleries in the country and the United States. He has private collections and in galleries such as: Labiosa Gallery and Miller Richardson in Virginia, Mr. Ronald Sandmayer, Governor Rafael Hernández Colón, Hotel San Juan Marriott and others.

He currently has his painting studio in the mountains of Cayey in Jájome. He donated this portrait to the School of Dental Medicine, Medical Science Campus.