2023 NEWSLETTER

Beyond Perception

"The Dentist" by Sir John Lavery

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The photo illustrates Flamenco Beach at the island named Culebra found on the coast of Puerto Rico.
Photo taken by Valeria S. Vega Berríos

LETTER FROM THE PRESIDENT

Dear Readers,

It is with great pleasure and enthusiasm that I, Joseluis E. Torres Colon, welcome you to the latest edition of our Student Research Group (SRG) Magazine, a testament to the vibrant spirit of exploration and learning that defines the School of Dental Medicine at the Medical Science Campus, University of Puerto Rico.

As the President of the SRG 2023-2024 chapter, my primary goal has been to bridge the gap between students and the captivating realm of dental research. We strive to provide our fellow students with not just knowledge but a comprehensive research experience that will resonate throughout their academic and professional journeys.

Our commitment is evident in the various seminars and workshops we've organized. From immersive research workshops showcasing the particularities of the research process to admission seminars guiding pre-dental students through the path to dental school, we aim to be the catalyst that propels aspiring dental investigators into a world of endless possibilities.

In this edition, you will find a compilation of diverse topics and literature reviews covering a spectrum of dental topics. The authors and contributors of our magazines come from dental students in their second and third years of the doctoral program. These up-and-coming researchers bring a wealth of knowledge and a fresh perspective to our magazine, reflecting the commitment of our doctoral students to advancing the field of dental medicine through cutting-edge research.

Our magazine also features a dedicated section tailored for pre-dental students. Here, two passionate pre-dental students have taken the reins to delve into dental topics and share their insights. This intentional initiative not only adds a unique perspective to our magazine but also serves as a platform for these future dental professionals to hone their skills in research article writing.

I extend my sincere gratitude to everyone who contributed to the making of this magazine. May it inspire, inform, and ignite the passion for dental research in each reader.

Thank you for being part of our journey.

Sincerely,
Joseluis E. Torres Colón, DS III
President, Student Research Group

The photo illustrates the forest "Los Pinos" in Cayey, Puerto Rico, showing the south coast of the island

Photo taken by @miguepix (ig)

Editor Notes

Greetings! We extend our warm appreciation for pursuing our second edition newsletter as valued members of the SRG community. Reflecting on the fall semester, we initiated our journey as a student organization with a compelling series of webinars. These informative sessions delved into crucial topics such as Crafting an Effective CV and Mastering the Art of Poster Presentations and navigating different search engines for scientific papers. These events aimed to equip our members with valuable insights and skills crucial for their academic and professional journeys.

In our ongoing commitment to enriching academic experience, we seized the opportunity to captivate a wider audience. We committed to this student organization by engaging the scientific community to contribute articles of their choosing within the realm of dental medicine. A special note of gratitude goes to the contributors of this newsletter, who, despite the challenges of the past year, generously shared their experiences and stories. Their willingness to contribute speaks volumes about the strength of our community and its commitment to mutual support and growth.

As you navigate through the contents of this newsletter, we invite you to discover inspiration from various facets of our community, ranging from impactful research experiences to the significance of community service.

In closing, we hope this newsletter serves not only as an informative resource but also as a source of inspiration and connection within the SRG community. Thank you for being an integral part of our collective journey, and we look forward to many more enriching experiences together!

Sincerely,
Adrian Suárez Torres, DS3
Newsletter Coordinator

The photo illustrates San Juan, Puerto Rico at 6:04am.
Photo taken by Valeria S. Vega Berríos

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Exploring Dental Medicine in Latin America and the Caribbean: Culturally Sensitive Approaches for Positive Impact

By: Jennifer Jiménez Cardona, DS III

Embarking on a week-long dental internship in the city of Havana, Cuba was an experience that left an everlasting mark in my professional career and my personal growth. Together with seven other passionate dental students, we set out into a venture full of learning, exploration, and cultural immersion. This article recounts our remarkable journey while highlighting the formation of an association aimed at providing similar opportunities to aspiring dental professionals like ourselves.

From the moment we stepped foot in the School of Odontology Raúl Gonzalez, we were welcomed into a vibrant dental community that was both accommodating and eager to share their knowledge with us. Our interactions with local students, dentists, and educators shined a light on the unique triumphs and challenges they each face within their profession. This exposure allowed us to gain an invaluable insight of how dentistry is practiced in a different cultural context.

Our daily tasks initiated with providing engaging presentations in the patient's waiting rooms, informing them about caries prevention, periodontal issues, and malocclusion. These informative sessions proved vital as they captivated patients, piquing their interest in oral health matters. As a matter of fact, some were so engaged that they approached us afterward, seeking further information and expressing their oral health concerns.

Figure 1: The presented picture shows the main building for the School of Odontology Raul Gonzalez Sanchez. From left to right, Kiany Serrano, Joseluis Torres, Valeria Vega, Sofia Vega, Ricardo Gelpi, two Faculty members from the School of Odontology, Nicole Isidor, Deyanira Barduena and Jennifer Jiménez. Photo by Jennifer Jiménez

Figure 2: The above picture was taken at the pediatric clinic at the school of odontology Raul Gonzalez with all the afore mentioned interns, doctors and staff of the department. Photo by Jennifer Jiménez

Our day continued by assisting doctors in the Pediatrics Department where we were captivated by their proactive approach to oral health disease prevention. We learned that even during pregnancy, a dedicated program educates expectant mothers on proper dental hygiene for their children. This way, mothers are aware of how they should care for their babies' oral health. Our days finished with lectures on emerging dental topics.

Beyond the dental aspect, our nights in Havana enriched us culturally. Exploring the city's historic streets, indulging in authentic Cuban cuisine, and immersing ourselves in their traditional music and dance scene provided a holistic experience that enhanced our understanding of the local way of life.

Inspired by our transformative experience, we returned home fueled with a shared vision – we are determined to create opportunities for other dental students to explore dentistry on a global scale. Hence, we founded the Humanitarian Dental Care Outreach Program, an association committed to providing aspiring dental professionals with similar internships around the world. By collaborating with educational institutions, healthcare organizations, and local communities, our association seeks to empower future dental practitioners with cultural competence and a global perspective.

Our next journey will be this November to Santo Domingo, in the Dominican Republic, where six dental students will have the opportunity to learn more about how dentistry is carried out in our sister island. We aspire this association can serve as a vehicle to expose dental students to different methodologies and approaches to the profession of dentistry used around the world. With this, we aim to enhance the education of aspiring dentists while fostering a sense of global awareness in this field.

Reference:
1. Jiménez, J. (2023). Pediatric clinic at the school of odontology Raul Gonzalez with all the afore mentioned interns, doctors and staff of the department [Photograph].
2. Jiménez, J. (2023). Main building for the School of Odontology Raul Gonzalez Sanchez. From left to right, Kiany Serrano, Joseluis Torres, Valeria Vega, Sofia Vega, Ricardo Gelpi, two Faculty members from the School of Odontology, Nicole Isidor, Deyanira Barduena and Jennifer Jiménez. [Photograph].

Safeguarding Little Smiles: Elevating Pediatric Oral Health Through Silver Diamine Fluoride in Preventive Dentistry

By: Valeria Vega Berrios, DS III

Promoting Oral Health in Children:

Oral health is a crucial aspect of overall well-being, especially in children. Cultivating oral habits since an early age sets the foundation for a lifetime of good oral health. The oral health of children begins with educating expectant mothers about the importance of maintaining good oral hygiene during pregnancy and proper oral care techniques. This type of approach presents an opportunity of early intervention to address dental issues before they become more severe. This lays the foundation for the child's dental well-being. Education is key. By teaching children about proper oral hygiene practices, such as regular brushing and flossing, as well as the significance of a healthy diet, they are empowered to take control of their oral health from a very young age. This in turns, reduces the incidence of dental issues in adulthood and minimizes the need for extensive dental treatments. Hence, the most effective approach to promote oral health in children is prevention.

In the ever-evolving landscape of dentistry, a revolutionary player has emerged, transforming preventive care, and offering new hope in the battle against dental caries. Silver Diamine Fluoride (SDF), a colorless liquid boasting 25% silver for its antimicrobial properties, 8% ammonia as a solvent, and an impressive 5% fluoride concentration is making significant strides in preventive dentistry.

Figure 3: Silver Diamine Fluoride (SDF) Leading the Way in Pediatric Dental Care. Photo by Park Smiles Kids. Retrieved from Pediatric Dentist NYC.

Understanding SDF

SDF is not merely a dental treatment; it's a proactive shield against the onset of dental caries. Like Dr. Jeremy Horst emphasized in his Elevating Care educational course, administering SDF annually on high-risk surfaces has proven remarkably effective preventing approximately 60% of new lesions, rivaling the success rates of traditional sealants. When faced with a radiographic lesion, dental professionals assign the code D1354, while the proactive application on a healthy tooth earns the code D1355.

Figure 4: Empowering Parents: A Guide to Pediatric Oral Care. Unveiling essential strategies for nurturing your child's dental health from the start. Photo by Dr. Corbet Ellison. Retrieved from Shadow Creek Ranch Dental Specialists

Delving into the intricate workings of SDF unveils its multifaceted impact. Operating as a bactericidal agent, it prevents bacterial growth, deactivates enzymes, and fosters remineralization into fluorapatite, consequently increasing lesion hardness. Remarkably, it also acts as a deterrent against demineralization, occluding dentinal tubules and penetrating deep into dentin. To unleash the full potential of SDF, a systematic approach is crucial. Isolation with cotton, thorough air drying, application with a micro-brush, and protecting the reaction for one minute constitute the procedural steps, ensuring optimal results.

At the moment, the guidelines practitioners have to decide which teeth would benefit preventively from the use of SDF are the following: primary anterior teeth in children under 3 years old, primary posterior teeth in the 3-6 age group, newly erupted molars, interproximal posterior surfaces in teenagers, and exposed root surfaces. This type of preventive measurement is just the first step in fortifying our commitment to early intervention and comprehensive oral health care, paving the way for a broader implementation of evidence-based strategies that prioritize the well-being of our patients and the longevity of their oral health.

Conclusion

Guidelines for SDF usage suggest a subtle approach. For individuals at mild risk, no application may be required, while those at moderate to high risk stand to benefit from an annual administration, presenting a tailored solution for varying patient needs. As we witness the paradigm shift in preventive dentistry, SDF emerges as a beacon of hope, offering a potent arsenal against the relentless onslaught of dental caries. Its efficacy, coupled with a strategic approach and careful consideration of patient risk factors, positions Silver Diamine Fluoride as a transformative force in the quest for enduring oral health.

Reference:
1. Elevating Care. (2023). Elevateoralcare.com. https://www.elevateoralcare.com/elevatingcare
2. Dr. Corbet Ellison. (2016, June 28). Oral Care for Kids: A Timeline for Parents - Shadow Creek Ranch Dental Specialists. Shadow Creek Ranch Dental Specialists https://pearlandental.com/oral-care-for-kids/ [Photograph].
3. Silver Diamine Fluoride (SDF)| Park Smiles Kids. (2020, April 16). Pediatric Dentist NYC. https://www.parksmileschildrensdentist.com/all-services/pediatric-dentistry/silver-diamine-flouride/ [Photograph].

In the Roots of Diversity: The Impact of Race on Root Anatomy in Oral Surgery

By: Joseluis Torres Colón, DS III

In the field of Dental Medicine, specifically Oral and Maxillofacial Surgery (OMS), the seemingly routine procedure of tooth extraction is revealed as a delicate undertaking, demanding meticulous planning and a comprehensive understanding of anatomical variables. This exploration delves into the details surrounding tooth extraction, shedding light on the influence of race and anatomical variations on this essential dental procedure, and its relevance for dental professionals.

Anatomy Matters: An In-Depth Look into Tooth Extraction

Tooth extraction, often considered a fundamental practice for Oral and Maxillofacial Surgeons (OMS), unveils its complexity when studied through the lens of anatomy. Variables such as the number of roots, their morphology, proximity to vital structures as the maxillary sinus and inferior alveolar nerve, and potential apical lesions require careful evaluation. Deviations from the norm in any of these variables can transform a routine procedure into a complex undertaking, exemplified by complications such as oroantral communication and fistula formation following the extraction of maxillary molars.

Race and Root Anatomy

An intriguing variable influencing tooth anatomy is the patient's race, as evidenced by studies examining root variations across different populations. R. Zhang study on 389 Chinese individuals revealed a 29% chance of mandibular first molars having three canals, challenging the conventional understanding (R. Zhang et al., 2011). Aydın's study on the Turkish population showcased the occurrence of three roots in 6.35% of maxillary first premolars and complex root anatomy in 21.9% of mandibular first premolars (Aydın H., 2022).

The Saudi population, as studied by Riyahi et al., exhibited an extra root in 3.05% of patients in mandibular first molars (Riyahi et al., 2019). Additionally, Chakradhar's investigation in Nepalese population discovered radix entomolaris, occurrence of an extra root, in 11.38% of mandibular first molars (Chakradhar et al., 2021). A meta-analysis by Aung and Myint found a global prevalence of 12% for radix entomolaris, linking it to geographical locations and Mongoloid descent (Aung et al., 2022).

Relevance for Dental Professionals

Dental professionals must be familiar with these anatomical distinctions, acknowledging the potential variations in root numbers among diverse populations. Careful analysis of patient radiographs becomes essential, allowing for the identification of such anatomical variations and aiding in the formulation of tailored treatment plans. By gaining a comprehensive understanding of the patient's unique dental anatomy through radiographic analysis, practitioners can anticipate challenges related to root morphology and strategically plan extractions. This proactive stance contributes to

the avoidance of inadvertent fractures, ensuring a smoother and more successful dental procedure. Furthermore, this meticulous approach not only enhances the precision of tooth extraction but also serves as a preventive measure against potential complications, such as root tip fractures.

Tackling Complications: Split Roots in Tooth Extraction

In the event of complications during tooth extraction, particularly the splitting of roots, dental professionals face a delicate situation that demands a strategic approach. The first critical step involves a meticulous assessment of the situation, determining not only the extent of the root fracture but also evaluating the accessibility for retrieval. Employing advanced imaging techniques, such as periapical or cone-beam computed tomography (CBCT) X-rays, could be used, offering a precise and detailed visualization of the fractured root tip. This heightened level of insight guides subsequent retrieval efforts, enabling dental professionals to navigate the complexities of the situation with greater precision.

For cases where the root tip is deemed loose, simple yet effective techniques, such as irrigation and suction, may suffice. However, in instances where greater control and precision are required, dental practitioners turn to specialized tools, including root tip elevators and root tip picks. These instruments allow for a more controlled and delicate approach, minimizing the risk of additional trauma during the retrieval process.

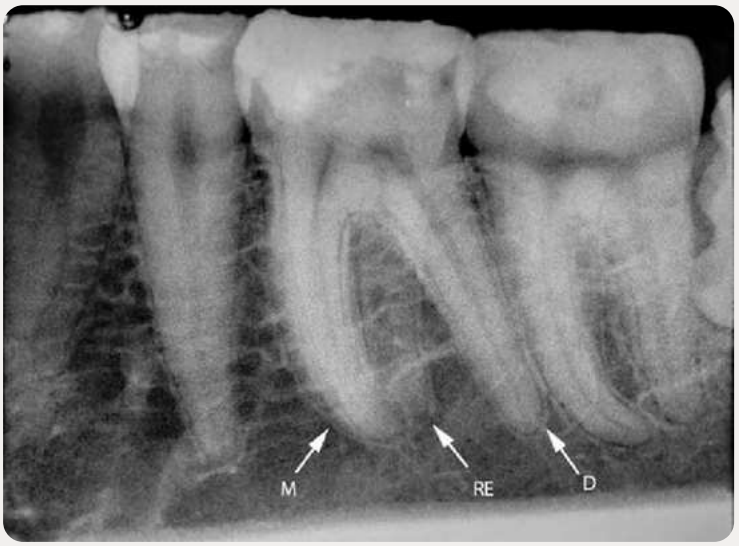

Figure 5: Three-rooted left mandibular first molar on the periapical radiograph of a 26-year-old male patient. M -mesial root, D -distal root, RE -radix entomolaris. From Strmšek, L., & Štamfelj, I. (2019). The prevalence of three-rooted permanent mandibular molars in a Slovenian population: A radiographic study. Anthropologischer Anzeiger; Bericht uber die biologisch-anthropologische Literatur, 76(2), 121–127. https://doi.org/10.1127/anthranz/2019/0942

Figure6: Three rooted maxillary first premolar. Photograph by Endodontics and oral (@Endodonticsand), 2015

In more challenging scenarios, surgical techniques may become necessary, showcasing the depth of expertise required in addressing intricate complications. The decision-making process involves a comprehensive evaluation of factors such as the size, depth, and infection status of the fractured root tip. In some instances, leaving the fractured root tip in place may be a judicious decision, particularly if specific conditions align with this approach.

Conclusion: Navigating the Dental Landscape

This comprehensive exploration into the complexities of tooth extraction illuminates the multifaceted interplay of anatomy, race, and the potential for complications, presenting a new perspective on the role of dental professionals. Beyond the straightforward task of tooth extraction, these professionals emerge as meticulous architects, deftly navigating the intricate and unique landscape of each patient's oral anatomy. By exploring the complexities of anatomical variations, particularly influenced by racial factors, dental practitioners not only enhance their diagnostic acumen but also fortify their ability to tailor treatment plans for diverse patient populations.

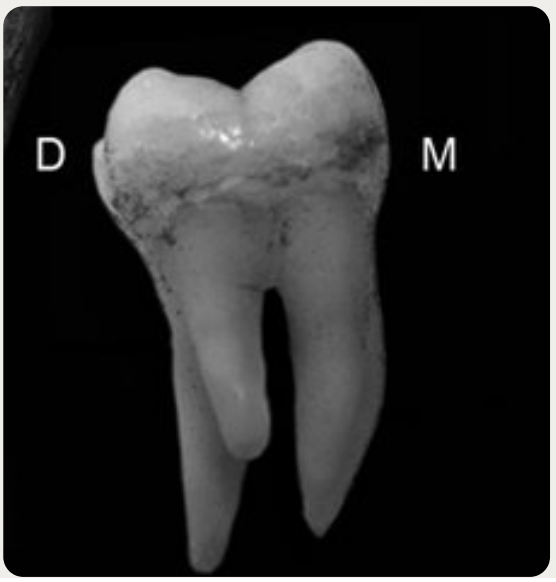

Figure 7: The 3-rooted lower molar anomaly. From Bailey, S. E., Hublin, J. J., & Antón, S. C. (2019). Rare dental trait provides morphological evidence of archaic introgression in Asian fossil record. Proceedings of the National Academy of Sciences of the United States of America, 116(30), 14806–14807. https://doi.org/10.1073/pnas.1907557116

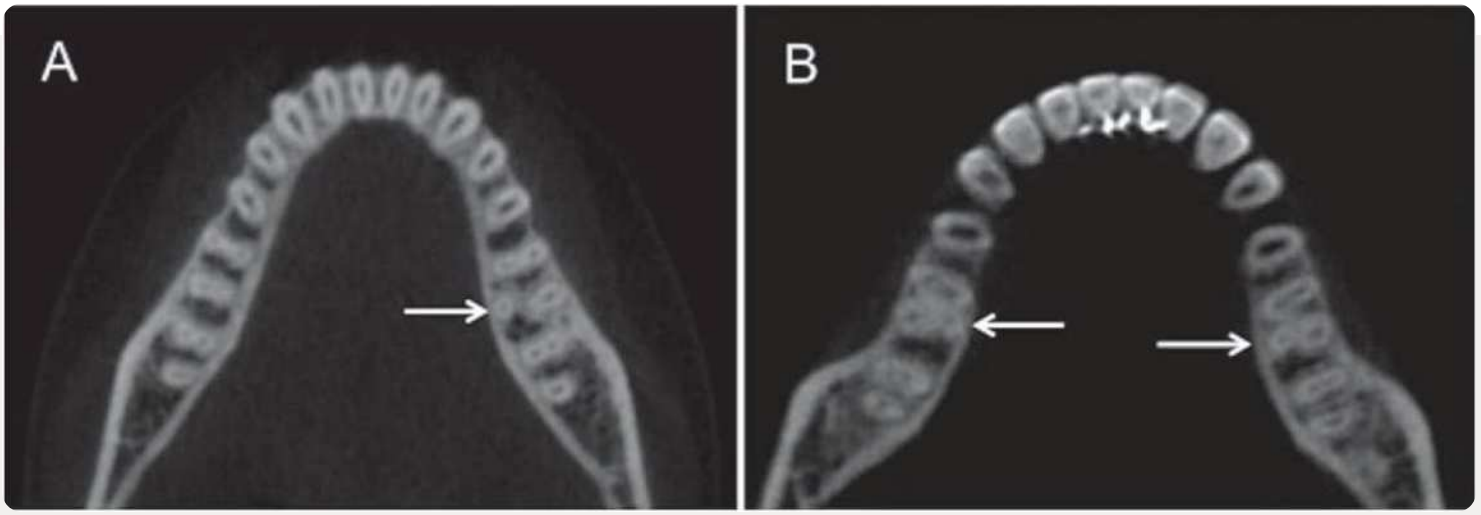

Figure 8: Cone-beam computed tomography images: (A) mandibular first molar with a distolingual root; (B) bilateral mandibular first molars with distolingual roots. From Rodrigues, C. T., Oliveira-Santos, C., Bernardineli, N., Duarte, M. A., Bramante, C. M., Minotti-Bonfante, P. G., & Ordinola-Zapata, R. (2016). Prevalence and morphometric analysis of three-rooted mandibular first molars in a Brazilian subpopulation. Journal of applied oral science : revista FOB, 24(5), 535–542. https://doi.org/10.1590/1678-775720150511

Reference:
1. Zhang, R., Wang, H., Tian, Y. Y., Yu, X., Hu, T., & Dummer, P. M. H. (2011). Use of cone-beam computed tomography to evaluate root and canal morphology of mandibular molars in Chinese individuals. International endodontic journal, 44(11), 990–999. ↩
2. Aydın H. (2022). Correlations between additional roots in maxillary second molars, maxillary first premolars, mandibular first molars and mandibular first premolars: a retrospective cone-beam computed tomography analysis. Odontology, 110(3), 584–595. https://doi.org/10.1007/s10266-022-00687-8.
3. Riyahi, A. M., Alssum, K., Hadadi, H., Alsayyari, A., Alebrah, T., & Aljarbou, F. (2019). Prevalence of three-rooted mandibular permanent first and second molars in the Saudi population. The Saudi Dental Journal, 31(4), 492–495. ↩
4. Chakradhar, A., Nepal, M., Pradhan, S., Acharya, N., & Poudel, P. (2021). Occurrence of extra roots in permanent mandibular molars: a cone beam computed tomography study. Journal of Nepalese Society of Periodontology and Oral Implantology, 5(1), 29-33. ↩
5. Aung, N. M., & Myint, K. K. (2022). Three-rooted permanent mandibular first molars: a meta-analysis of prevalence. International Journal of Dentistry, 2022. ↩
6. Rodrigues, C. T., Oliveira-Santos, C., Bernardineli, N., Duarte, M. A., Bramante, C. M., Minotti-Bonfante, P. G., & Ordinola-Zapata, R. (2016). Prevalence and morphometric analysis of three-rooted mandibular first molars in a Brazilian subpopulation. Journal of applied oral science : revista FOB, 24(5), 535–542. https://doi.org/10.1590/1678-775720150511
7. Strmšek, L., & Štamfelj, I. (2019). The prevalence of three-rooted permanent mandibular molars in a Slovenian population: A radiographic study. Anthropologischer Anzeiger; Bericht uber die biologisch-anthropologische Literatur, 76(2), 121–127. https://doi.org/10.1127/anthranz/2019/0942
8. Endodontics and oral. [@Endodonticsand]. (2015, December 4). Three rooted maxillary first premolar [Photograph]. X. https://twitter.com/Endodonticsand/status/672844080334942209/photo/1
9. Bailey, S. E., Hublin, J. J., & Antón, S. C. (2019). Rare dental trait provides morphological evidence of archaic introgression in Asian fossil record. Proceedings of the National Academy of Sciences of the United States of America, 116(30), 14806–14807. https://doi.org/10.1073/pnas.1907557116

The Artistry of Dentistry: Tracing the Artistic Threads in Dental History.

By: Kiany Serrano Lugo, DS III

"Art is nothing but humanized science", said futurist artist Gino Severini, representing in a single quote the connection between art and science. And what is dentistry without art? Every specialist will answer this question differently, one or the other making different remarks. But where did art represent dentistry, and when did this profession become the muse of art? Well, as with everything in history, the first artistic representation was the Egyptians with Hesy-Re, a famous dentist (figure 9). In this hieroglyphic, we can see his instruments placed in a harmonious way, nothing like real life but not always life imitates art. Since then, dentistry has been portrayed in different art movements, times, and mediums. In medieval times engravings and newsletters were the order of the day, authors like Lucas van Leyden a well-known engravers and painter, started portraying the most dreaded procedure for any patient: extractions. As we can see in figure 10 a caricaturesque engraving titled Der Zahnbrecher, "The tooth-drawer". This made this name our almost surname and from then the prime title for every painting in the Renaissance, Baroque, and Rococo art.

Figure 9: Dentist in the Antient Egypt. Photo retrieved from Hesy- Re, heroglyphic. (2023, May). Dentistas en el antiguo Egipto. - Artedental. Artedental. https://www.artedentalclinic.com/es/egipcios/

Baroque, the commencement of the "tooth-drawer" menace

In its flamboyant, dramatic, deep colors, light, and theatrical style dentistry, especially the extractions, became the muse of Baroque authors. Theodoor Rombouts (1597-1637) portrayed in A Troupe of Travelling Performers, including a Toothdrawer (figure 11.) the beginnings of dentistry as a profession. In the 17th century, traveling actors partnered with toothdrawers in entertainment troupes. These skilled toothdrawers, not part of the local surgeon guild, faced legal challenges as established surgeons accused them of being charlatans, seeking to protect their businesses.

Figure 10: The Dentist, Lucas van Leyden engraving, 11,7 x 7,5 cm., 1523. Photo retrieved from Fuentes, J. (2021). Arte y odontología / Art and Dentistry (V). Blogspot.com. https://elhurgador.blogspot.com/2021/07/arte-y-odontologia-art-and-dentistry-v.html

However, these traveling performers carried out a useful service, were often brilliant entertainers, and were therefore a very popular and welcome presence at fairs and markets. As we can see, art is also a way to know the past but most importantly how better is the present. But as science and life progresses so does art. As we can see in The dentist (1622) (figure 12) by Gerrit Van Honthorst we can see that dental procedures were performed with an audience, far from the clinic. Forget the dental loupes! A single candle was everything needed and by the expression of the patient, lidocaine was far from being known. Without a doubt, the Baroque gave the suspense needed for a procedure such as an extraction.

Dentistry beyond western

As we all know, art is not a Western discovery, and tooth extractions are not the exception, for art and teeth are things that connect all humans. In the 1700s in Japan, Utagawa Kuniyoshi's The Marvelous Doctor Treats Serious Diseases (figure 13) shows us a dentist using forceps not so far from a modern one. In Ucrane artists like Anatoly Gennadievich Kozelsky show a fun and caricaturesque way of dentistry (figure 15) that paved the way for a more modern view of dentistry.

Modern days in dentistry and art

Now let's fast forward to the modern era of art and science "The Roaring 20's". A prospering world, where after World War I havoc a new generation hungry for life, modernity, and freedom was rising. In art, painters like Edvard Munch, Picasso, Frida Kahlo, and Salvador Dalí were making new styles showing the bizarre, and hectic truth of life.

Figure 11: A Troupe of Travelling Performers, including a Toothdrawer, Theodoor Rombouts (1597-1637), oil in canvas. Photo retrieved from admin. (2017, May 29). EL ARTE DE LA ODONTOLOGÍA - Gímenez Clínica Dental. Gímenez Clínica Dental. https://www.gimenezclinica.com/el-arte-de-la-odontologia/

In dentistry, the 1920s were an age of advancement, just like Picasso's cubism, things like the use of x-ray technology on teeth, Dr. Frederick McKay study of fluoride's effects on enamel health–ultimately leading to the fluoridation of city water across the United States, and dental schools taking shape, modernity was breaking barriers. Leaving behind Van Honthorst's candle, John Lavery's The Dentist, (1939) (figure 16) shows us a clinic not so far from the modern ones. A dentist using dental loupes, a modern dental chair, and a proper lamp shows us that dentistry was taking an Avangard movement just like art. Moving forward to World War II, Leslie Cole's Dentistry during the Hour of Gas Practice (1942) (figure 14) shows us the reality of life in such troublesome times and how, as always, dentistry is a not-far-from-politics profession. Reminding us when Covid-19 struck, where, no matter how hard it was, we kept working.

Figure 12: The dentist (1939), Photo retrieved from John Lavery. admin. (2017, May 29). EL ARTE DE LA ODONTOLOGÍA - Gímenez Clínica Dental. Gímenez Clínica Dental. https://www.gimenezclinica.com/el-arte-de-la-odontologia/

Figure 13: The Marvelous Doctor Treats Serious Diseases, woodblock print (nishiki-e); ink and color on paper, 37,7 x 76,3 cm., 1850. Photo retrieved from Utagawa Kuniyoshi. Fuentes, J. (2021). Arte y odontología / Art and Dentistry (IV) - Fuera de Europa / Outside Europe. Blogspot.com. https://elhurgador.blogspot.com/2021/06/arte-y-odontologia-art-and-dentistry-iv.html

Life imitates art and dentistry imitates art

After all these art history lessons, from the Egyptians to the modern artists, we can see that art as a whole is like dentistry, always searching for the esthetic, the right shade, the right color. The intricacies of brush strokes in art mirror the meticulous approach of dental procedures, both driven by an inherent pursuit of perfection. Thus, the intertwined journey of art and dentistry unfolds, reflecting our collective pursuit of beauty and precision. To answer "What is dentistry without art?" is a deep question. The prosthodontist will tell you that art is everything, from understanding how the light will rebound in the zirconia, to how the hues of teeth are the most important thing to make a not-so-natural smile seem like it was always there.

Figure 14: Dentistry during the Hour of Gas. Photo retrieved from Pract ice, 1942. Leslie Cole, oil on canvas. Dentistry during the Hour of Gas Practice | Art UK. (2023). Artuk.org. https://artuk.org/discover/artworks/dentistry-during-the-hour-of-gas-practice-6937

The endodontist will tell you that maybe, just maybe, art is in the brush-like strokes one should make with rotatory instruments. The periodontist and oral surgeon will tell you art is in a gingivectomy, the precision of the scalpel, the art of making a broken nose or mandible look brand new with every stitch. For all we know this makes dentists "frustrated artists" or "an artist with science at heart". For this, it only makes sense to portray such an artistic profession in colors and canvas throughout history.

Figure 15: Dentist, oil on canvas, 40 x 50 cm. Anatoly Gennadievich Kozelsky. Fuentes, J. (2021). Arte y odontología / Art and Dentistry (IV) - Fuera de Europa / Outside Europe. Blogspot.com. https://elhurgador.blogspot.com/2021/06/arte-y-odontologia-art-and-dentistry-iv.html

Figure 16: The dentist, oil on canvas, John Lavery. Photo retrieved from John Lavery's "The Dentist" | Art UK. (2013). Artuk.org. https://artuk.org/discover/stories/john-laverys-the-dentist

Reference:
1. Pract ice, 1942. Leslie Cole, oil on canvas. Dentistry during the Hour of Gas Practice | Art UK. (2023). Artuk.org. https://artuk.org/discover/artworks/dentistry-during-the-hour-of-gas-practice-6937
2. John Lavery's "The Dentist" | Art UK. (2013). Artuk.org. https://artuk.org/discover/stories/john-laverys-the-dentist
3. Fuentes, J. (2021). Arte y odontología / Art and Dentistry (IV) - Fuera de Europa / Outside Europe. Blogspot.com. https://elhurgador.blogspot.com/2021/06/arte-y-odontologia-art-and-dentistry-iv.html
4. Utagawa Kuniyoshi. Fuentes, J. (2021). Arte y odontología / Art and Dentistry (IV) - Fuera de Europa / Outside Europe. Blogspot.com. https://elhurgador.blogspot.com/2021/06/arte-y-odontologia-art-and-dentistry-iv.html
5. admin. (2017, May 29). EL ARTE DE LA ODONTOLOGÍA - Gimenez Clinica Dental. Gimenez Clinica Dental. https://www.gimenezclinica.com/el-arte-de-la-odontologia/
6. Fuentes, J. (2021). Arte y odontología / Art and Dentistry (V). Blogspot.com. https://elhurgador.blogspot.com/2021/07/arte-y-odontologia-art-and-dentistry-v.html
7. Hesy- Re, heroglyphic. (2023, May). Dentistas en el antiguo Egipto. - Artedental. Artedental. https://www.artedentalclinic.com/es/egipcios/

Beyond Root Canals: Embracing Vital Pulp Therapy in Endodontics

By: Sofia Vega Berrios, DS III

Introduction:

In traditional endodontic practices, the onset of irreversible pulpitis frequently steered clinicians towards the adoption of root canal therapy (RCT) as the gold standard for care. However, the inherent drawbacks of RCT, including the potential loss of vascularity and an elevated susceptibility to fractures, have triggered a comprehensive reevaluation of treatment options. This reassessment has paved the way for the ascent of vital pulp therapy (VPT) as a promising alternative, seamlessly aligning with the principles of minimally invasive endodontics (MEI). VPT, encapsulated as "treatment aiming to preserve compromised but not destroyed pulp tissue," stands as a beacon of innovation within endodontics. This therapeutic avenue involves the meticulous removal of a specific quantity of pulp, contingent on pulpal status, strategically preserving both soft and hard tissues. The overarching goal of VPT procedures lies in establishing optimal conditions for pulp tissue repair and preservation, introducing a paradigm that advocates for preservation over complete removal. At the heart of VPT's essence, is the elimination of pulpitis by fostering the formation of reparative dentin or a calcium bridge. This not only rescues the tooth from inflammation but also empowers it to sustain a myriad of physiological functions. The culmination of this intricate process manifests in the preservation of pulp vitality and the enduring retention of affected teeth.

Within the realm of VPT procedures, the primary objective is to craft optimal conditions for pulp tissue repair and preservation. Decisions regarding the removal or retention of pulp tissue hinge upon meticulous tissue viability assessments, which include visual access for evaluating hemorrhage control and the clinical appearance of tissues. Contrary to conventional wisdom, a diagnosis of irreversible pulpitis does not invariably necessitate pulpectomy, as more conservative alternatives can be judiciously explored.

Figure 17: Pulp Anatomy. Photo retrieved from Root Canals. Apex Sleep Dentistry. (n.d.). https://apexsleepdentistry.com/service/root-canals/

american association of endodontists

specialists in saving teeth

Figure 18: Logo of the AAE. Photo retrieved from Endodontists: The Root Canal specialists. American Association of Endodontists. (2023, October 4). https://www.aae.org/

The AAE Consensus:

The challenges in diagnosing irreversible pulpitis have prompted the American Association of Endodontists (AAE) to recognize the complexities and advocate for a critical reassessment of diagnostic criteria. Traditionally, mature permanent teeth with irreversible pulpitis underwent pulpectomy and root canal filling. However, contemporary histological studies reveal a disparity between clinical symptoms, pulp sensibility testing, and actual histological pulp status, challenging the standard approach.

The AAE, dedicated to excellence in endodontics, forms the basis for endodontic treatment, combining evidence from scientific studies with clinical knowledge. Vital pulp therapy (VPT) techniques aim to preserve dental pulp vitality following trauma, caries, or restorative procedures. While traditionally focused on immature adult teeth, VPT now offers alternatives for mature teeth previously assumed to have irreversibly inflamed pulps. The AAE's position statement addresses diagnostic considerations, caries and pulp management, biomaterial placement, and restoration, providing valuable insights for practitioners considering VPT procedures.

Procedural Decisions and Future Directions:

The nuanced decisions surrounding the amount of pulp tissue retained or removed pivot on operator assessments, clinical acumen, the overarching treatment plan, and the patient's general oral and systemic health status. Advocating for additional clinical trials to scrutinize the long-term outcomes of vital pulp therapy and the exploration of chairside techniques utilizing biomarkers for pulpal viability underscore the dynamic evolution of endodontic practices. A comprehensive review of endodontic diagnostic terminology is also warranted to accurately classify the severity of pulpal disease.

Figure 19: Pulp Anatomy. Photo retrieved from Clínica Trei. (2022, October 17). Calidad de los Materiales del Laboratorio dental. https://www.clinicatrei.com/blog/calidad-de-los-materiales-del-laboratorio-dental/

Conclusion:

In the ever-changing field of endodontics, vital pulp therapy stands out as a promising strategy, providing a dynamic approach to safeguarding pulpal health. Dental professionals, positioned at the forefront of this evolution, are contributing to the lasting preservation of teeth by adopting minimally invasive techniques, customizing treatments for individual cases, and challenging established diagnostic criteria. Through these proactive measures, they aim to mitigate the risks conventionally linked with root canal therapy, offering a renewed sense of optimism for the future of endodontic care.

Reference:
1. American Association of Endodontists. Guide to clinical endodontics. 6th ed. Available from URL: www.aae.org. American Association of Endodontists Consensus conference recommended diagnostic terminology. J Endod 2013; 35: 1634.
2. Bergenholtz G, Axelsson S, Davidson T et al. Treatment of pulps in teeth affected by deep caries - a systematic review of the literature. Singapore Dent J 2013; 34: 1–12.
3. Vital pulp therapy of mature permanent teeth ... - Wiley Online Library. (n.d.). https://onlinelibrary.wiley.com/doi/10.1111/aej.12392

From Industrial Hygiene to Dental Care: A Multidisciplinary Approach to Health and Safety

By: Diana Silva, DS III

General Public health, Occupational health and more specifically Dental health, have always been my subjects of interest. When I finished my bachelor's, I began my master's degree in Industrial Hygiene, IH, at the University of Puerto Rico, Medical Sciences Campus, as the first steps to become a health care worker. My IH training provided me with the knowledge and preparation to take care of people's health, but from an employee's occupational health and safety perspective. I am confident that my IH background was an important element that contributed towards my successful application to study dental medicine. I was eager to continue my education on another medicine related field, because it would further expose me to another perspective on healthcare. In this sense, my newly acquired competence in IH opened the door to another direction that, although different from the one I was taking with industrial hygiene, would expose me to a variety of experiences with dental health care providers, patients, and the general public, where I could contribute with the knowledge acquired in my master's degree. This is why I chose dental medicine as the ultimate direction in my health care professional career.

Figure 20: Dental student attending one of her patients. Photo taken by Mario Robles

Currently in my third year of dental medicine, I continue to take care of health from a different perspective. With my exposure to industrial hygiene, I was able to comprehend how to manage the biological hazards or materials we are exposed to as dental professionals on a daily basis, without my health and safety being put at risk. In addition, I am capable of identifying these hazards more effectively, as well I better understanding the importance of following all the protocols that are applicable to the management of hazardous waste, especially as it pertains to its safe disposal. Not only has the knowledge of industrial hygiene provided me more insight about how hazardous materials can become a health and safety risk to dental professionals, but it has also trained me on how to manage exposure to radiation within safety levels. The third aspect in which my industrial hygiene background helped me was in applying ergonomics to my daily activities and office's spaces in which I work as a dental professional. In this case, ergonomics and industrial hygiene helped me choose better postures when working with patients, as well as how to manage safe air exchange rations in the office to maintain a clean environment for the employees and patients.

Figure 21: The Guillermo Arbona Irizarry Building is the main building of the Medical Sciences Campus. Image retrieved from Universidad de Puerto Rico. https://www.upr.edu/rcm-publica-encuesta-en-linea-para-medir-cuanta-gente-se-quiere-vacunar-contra-el-covid-19/

In my third year of dental medicine, I confirm my commitment to apply industrial hygiene to improve health and safety in the dental profession while taking care of the dental health of my patients. Being IH a discipline within Public Health, I have been able to identify the factors that affect the dental health of patients. Many of my patients have not had full access to the dental care they need due to Public Health factors that are often beyond their control. My combined training in Public Health, Industrial Hygiene and Dental Medicine has helped identify contributing factors to poor dental health that can be controlled using Public Health and Industrial Hygiene strategies. My experience so far has proven that the combination of both professions I chose in my career path are valuable when assessing and managing my patients' dental health problems.

Figure 22: The logo of the Public Health School. Image retrieved from RCM-EGSP. https://rcm1.rcm.upr.edu/sp/

Reference:
1. Robles, M. (2023), Dental student attending one of her patients [Photograph].
2. RCM-EGSP. Escuela Graduada de Salud Publica - RCM UPR. (n.d.). https://rcm1.rcm.upr.edu/sp/
3. RCM publica encuesta en línea para medir cuánta gente se quiere vacunar contra el covid-19. Universidad de Puerto Rico. (n.d.). https://www.upr.edu/rcm-publica-encuesta-en-linea-para-medir-cuanta-gente-se-quiere-vacunar-contra-el-covid-19/ [Photograph].

Comprehensive Considerations in Dental Treatment: Balancing Preservation and Innovation

By: Adrian Suarez Torres, DS III

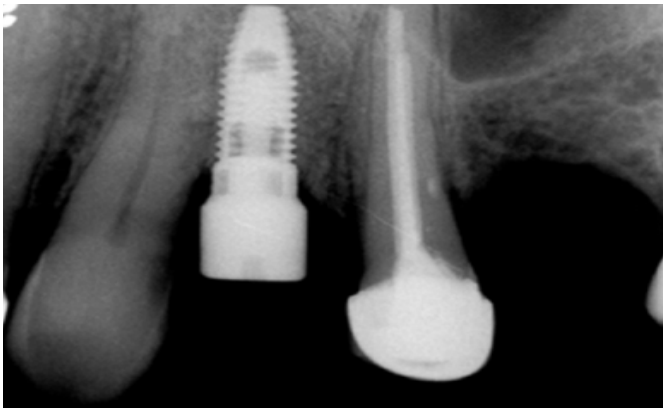

Figure 23: Xray of Implant and Root Canal Treated Tooth. Image retrieved from https://www.osseonews.com/periapical-radiolucent-lesion-around-the-implant-diagnosis-and-treatment/

Toothaches are a common issue in the public community, prompting patients to seek necessary pain relief such as intra oral medications or a visit to a dentist. Among the widely employed treatments for alleviating pain are root canal therapy and tooth extraction. Over the last two decades, advancements such as the introduction of biomaterials, the use of dental operating microscopes in both surgical and nonsurgical procedures, and enhancements in engine-driven instruments for root canal preparation have contributed to an increased success rate in endodontic treatment.

In contemporary dentistry, an increasing number of practitioners are leaning towards choosing implants over traditional root canal therapy, inadvertently moving away from the foundational principle of preserving the integrity of the tooth structure. A disproportionate emphasis on extraction and implant placement in commercial contexts has created a tendency among dentists to choose it, even for teeth that can be treated endodontically.

Improper guidance from dentists may lead to patients losing their teeth. Therefore, in cases where implants are financially unfeasible, dentists should prioritize preserving the tooth for as long as possible.
Key considerations for dentists when formulating comprehensive and patient-centric treatment plans, whether involving Root Canal Treatment or dental implants, encompass a thorough evaluation of factors such as following:

Duration:

Significantly longer periods are required for implant-based tooth replacement compared to RCT and the subsequent placement of a permanent restoration. In essence, RCT is expected to yield earlier functional and cosmetic results compared to extraction and implant placement.

Mastication Force:

The strength of mastication force in both endodontically treated teeth and implants is influenced by various factors. When endodontic treatment (RCT) is conducted correctly and the tooth is properly restored, it can exhibit significant mastication force. This is due, in part, to the retention of proprioceptive feedback, a quality that implants lack as they do not possess periodontal ligaments. Successful integration of implants allows them to withstand normal biting forces, but the absence of proprioceptive feedback differentiates them from natural teeth treated with RCT.

Treatment Success and Survival Rates:

If both Root Canal Treatment (RCT) and implant placement are executed with precision and adherence to best practices, no significant disparity is noted in the survival rates between the two, underscoring the importance of meticulous procedural execution for ensuring optimal treatment success and long-term viability

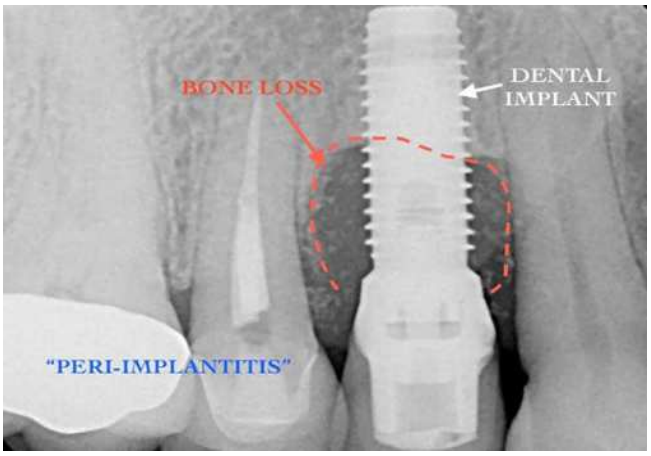

Figure 24 : Xray of defective implant and Root Canal Treated Tooth. Image retrieved from https://portlandperioimplantcenter.com/implant-disease-and-therapy/

Financial Considerations:

Treatment costs for extraction and implant surpass those of RCT and full-coverage permanent restoration in any medical plan. From a cost-benefit perspective, RCT's are significantly more economically viable than implants.

Complementary Treatments:

Endodontically treated teeth, having undergone the meticulous process of root canal treatment, display a noteworthy advantage with a significantly reduced need for additional treatments after the final restoration. In contrast, implants, while effective in tooth replacement, typically necessitate a more intricate regimen of post-replacement maintenance. This disparity in the demand for additional care highlights the distinct long-term considerations associated with endodontically treated teeth and implants.

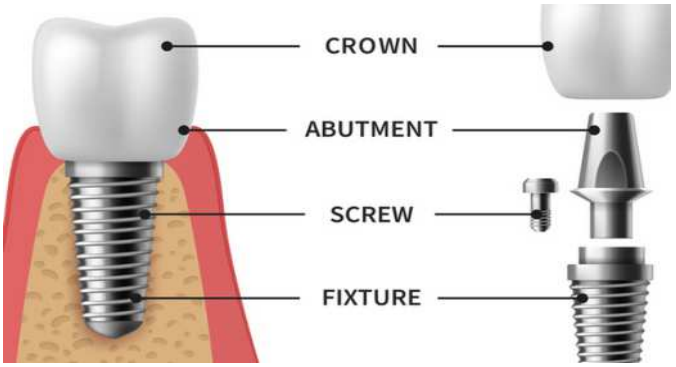

Figure 25 : Illustration of Dental Implant Parts. Image retrieved fromhttps://www.exceldentalpc.com/dental-implants-13.html

Patient Preferences:

Patient preferences play a pivotal role in the decision-making process when considering dental treatments, particularly between implants and endodontic (root canal) treatment. Understanding and incorporating patient preferences into treatment decisions is essential for fostering patient satisfaction and compliance. This not only involves presenting clear information about the available options but also actively engaging patients in the decision-making process. Dentists can play a crucial role in educating patients about the benefits and potential challenges associated with both implant and endodontic treatments, ensuring that the chosen approach aligns with the patient's expectations and overall oral health goals. This patient-centered approach contributes to a more collaborative and informed decision-making process in dental care.

Conclusion

In the evaluation of Root Canal Treatment and extraction with implant placement, a general inclination emerges favoring the preservation of natural teeth. With this said, it is important to note that the practitioner's decision-making process is regulated largely by the patient's final saying. The dentist has a duty to engage patients in the treatment planning process, providing a professional perspective by elucidating the potential outcomes of retaining the tooth, outlining the associated costs, and presenting alternative treatment options.

Reference:

1. Di Fiore, P. M., Tam , L., Thai , H. T., & Hittelman, E. (2008, March 1). Retention of teeth versus extraction and implant ... - Wiley Online Library. Wiley Online Library. https://onlinelibrary.wiley.com/doi/abs/10.1002/j.0022-0337.2008.72.3.tb04501.x
2. Kakoei, S., Fatemian, M., Eskandari Zadeh, A., Parirokh, M., & Haghdoost, AA. (2012, September 1). Evaluation of reasons of permanent teeth extraction in Iranian people (2009). Journal of Dentistry. https://dentjods.sums.ac.ir/article_43473.html
3. Setzer, F. C., Boyer, K. R., & Jeppson, J. R. (2011, January). Long-term prognosis of endodontically treated teeth: A retrospective analysis of preoperative factors in molars. Journal of endodontics. https://pubmed.ncbi.nlm.nih.gov/21146070/

The Impact of Micronutrients Deficiencies such as Ascorbic Acid on Oral Health

By: Coralys M. Ortiz Figueroa, DS II

Nutrition is one of the biggest challenges of our lives because it directly effects our bodies metabolisms. Proper nutrition can impact our health more than many people are aware, particularly when it comes to the impact on oral health. The food we consume throughout our entire lives directly impacts our oral health through our digestive system; the process that controls our entire metabolism that starts with the oral cavity.

Periodontitis is an irreversible oral disease produced when different bacterias such as Porphyromonas gingivalis, Actinibacillus actinomycetemcomitans, Prevetellas, Bacteroides forsythus, Eikenella, and Capnocytophaga cause inflammation on the gingiva directly and negatively impacting the periodontal ligament. The periodontal ligament is responsible for anchoring the tooth's root in the sockets of the alveolar bone. Vitamin C plays an important role as antioxidant on our health. Vitamin C deficiencies, also known as scurvy, occurs Biochemically, as ascorbic acid helps d-alpha-tocopherol to remove the radicals of the cell membranes to prevents propagation that induces apoptosis of the cell.

Multiple studies suggest that patients with periodontitis also have a deficiency in vitamin C, the radicals promote the apoptosis of the cells that make up the periodontal ligament producing a chronic inflammation of dental tissues, gingival bleeding, bag formations on the gingiva, destruction of alveolar bone and, as a result, a possible loose of dental pieces (Jung-Hoo L, et al 2017).

Figure 26: Fruits and vegetables. Photo retrieved from Bodybuilding.com (2021, July 1). https://www.bodybuilding.com/content/top-5-micronutrient-shortfalls.html

Studies have demonstrated that a deficiency of vitamin C can exacerbate symptoms of Periodontitis (Ji-Youn, et al 2019). Until recently, the scientific community or the dental community have not identified a cure for the periodontitis, however there are treatments including: surgeries, bone grafts, and stimulating tissues by proteins. Periodontitis is categorized as irreversible, however recent studies about the possible positive impact that has the vitamin C on gingival progenitor cells can be a future treatment of the oral health which in turn, it can be a powerful boost for the immunological system.

Future Research

Research like this, challenges dental students to use our critical thinking and motivate students to do more dental literature research. Future research should focus on identifying the gravity of the ascorbic acid deficiency in Puerto Rico and contribute to the statistical analysis around the world with real and actualized data from our island. The research will help raise awareness on the direct impact that nutrition has on our overall health. Good nutritional habits can lead to more successful outcomes; the key that opens the door for a universe full of a better lifestyle, better oral health, and a big healthy smile.

References:
1. a.nerjee R, Chahande J, Banerjee S, Radke U. 2018. Evaluation of relationship between nutritional status and oral health related quality of life in complete denture wearers: Official publication of indian society for dental research. Indian J Dent Res. 29(5):562-567. http://dx.doi.org/10.4103/ijdr.IJDR_285_17
2. Chitsazi M, Faramarzie M, Sadighi M, Shirmohammadi A, Hashemzadeh A. 2017. Effects of adjective use of melatonin and vitamin C in the treatment of chronic periodontitis: A randomized clinical trial. J Dent Res Dent Clin Dent Prospects. 11(4):236-240. http://dx.doi.org/10.15171/joddd.2017.041
http://uprcayey.idm.oclc.org/login?url=https://www.proquest.com/scholarly-journals/effects-adjective-use-melatonin-vitamin-c/docview/1989487416/se-2?accountid=44829
3. Ji-Youn H, Jung-Seok L, Seong-Ho C, Hyun-Seung Shin, Jung-Chul P, Shin S, Jong-Hyuk Chung. 2019. A randomized, double-blind, placebo-controlled multicenter study for evaluating the effects of fixed-dose combinations of vitamin C, vitamin E, lysozyme, and carbazochrome on gingival inflammation in chronic periodontitis patients. BMC Oral Health. Vol. (19):1-8 http://dx.doi.org/10.1186/s12903-019-0728-2
4. Jung-Hoo L, Myung-Seop Shin, Eun-Jeong K, Yoo-Been Ahn, Hyun-Duck K. 2017. The association of dietary vitamin C intake with periodontitis among korean adults: Results from KNHANES Ⅳ. Plos One. 12(5):1-14. http://dx.doi.org/10.1371/journal.pone.0177074

Pre-Dental Student Section

The photo illustrates "El Morro" at Old San Juan,Puerto Rico.
Photo taken by Kiany Serrano Lugo

Microplastics in Dentistry: A Small Problem with Big Implications

By: Marlian Alicea Melecio

Every time you brush your teeth, you can unintentionally contribute to one of the planet's most severe environmental problems. Microplastics are a hidden threat in the vast ocean of routine dental procedures that can be found in your toothpaste and dental floss. Although we usually link microplastics to environmental issues and ocean pollution, they have also found their way into our mouths, which are considerably closer to home. Microplastics are particles < 5 mm, are ubiquitous in our environment, and originate from various sources, such as the decomposition of bigger plastics, synthetic fibers, and microbeads used in personal hygiene products. Although their effects on the environment have received much attention, there has yet to be much talk about them in dentistry. Dental treatments and supplies, like floss and toothpaste, have the potential to introduce microplastics into the environment. Research has revealed that some toothpaste brands include microplastics because of their abrasive qualities, raising concerns about standard oral hygiene practices worldwide. It is critical to comprehend the scope of this problem and its possible effects

Figure 27: Size of microplastics. Photo retrieved from Nuestro Clima. https://nuestroclima.com/no-es-un-ave-ni-un-insecto-el-microplastico-en-el-aire-afecta-seriamente-a-la-salud/

Microplastics and Oral Health

Dental microplastics, such as PE particles found in Colgate toothpaste (Fig 1A), present a complex difficulty. These tiny particles raise concerns about their effects on oral health and add to environmental pollution. However, preliminary studies indicate that microplastics may enter oral tissues and cause several health problems. Furthermore, because of their vast surface area, microplastics are well-recognized to absorb and collect environmental poisons. Nonetheless, the research suggests that microplastics are a real issue in dentistry. A study discovered the presence of microplastics in toothpaste and dental floss, among other dental goods. According to this research, 76% of the analyzed toothpaste brands from Malaysia, Turkey, and India had microplastics, ranging in concentration from 0.15 to 4.14 particles per gram.

The study also discovered that the abrasive properties of microplastics may harm tooth enamel. A different study examined the possible health effects of microplastics in dental hygiene products. In a separate case, a U.S. investigation found that microplastics were often present in dental floss products from multiple well-known brands. Their research revealed that microplastics were present in 83% of dental floss samples, indicating the problem's geographical prevalence. The outcomes in both cases demonstrate the urgency with which dental care must deal with microplastics and the potential harm they may cause to oral health.

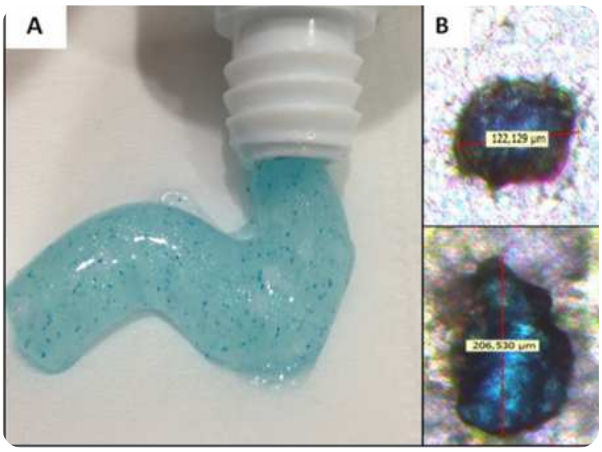

Figure 28: PE particles, found in Colgate Max Fresh toothpaste, are tiny plastic pieces that can be ingested by marine animals and humans, posing a potential threat to health and the environment. Bråte, I. L. N., Blázquez, M., Brooks, S. J., & Thomas, K. V. (2018). Weathering impacts the uptake of polyethylene microparticles from toothpaste in Mediterranean mussels (M. galloprovincialis). Science of the Total Environment, 626, 1310-1318.

Solutions and Awareness

Acknowledging the problem is just the beginning. It is crucial to raise awareness among the public and dental practitioners. It is the responsibility of dental associations and organizations to initiate education among their members regarding the possible hazards linked to microplastics. It is necessary to reevaluate dental hygiene practices to reduce the usage of microplastic items. Furthermore, there is a pressing need for financing and research projects to examine the level of microplastic contamination in dental care items and how it affects oral health. Dentistry and the environmental field should collaborate to tackle this problem from all angles. Additionally essential are the creation and marketing of dental products free of microplastics. It is recommended that manufacturers explore novel substitutes for microplastics to maintain dental care efficacy while mitigating environmental impact. An effort like this would help the environment and appeal to environmentally aware customers.

Microplastics in dentistry call us to action where tiny, frequently undetectable factors have enormous repercussions. Because of the interconnectedness of our planet, these small particles have found their way into our regular oral hygiene practices. They are posing a threat to both our health and the ecosystem. It is obvious what needs to be done: cut back, switch out, and reconsider the items we use to maintain healthy teeth. It is time for the dental community to own up to its part in the microplastic issue and take decisive action toward a more sustainable and healthful future. Let us be the composers of a better, more sustainable society for future generations in a world where even the smallest notes we play can harmonize into a song of enduring change. The moment to take action is now because, despite the tiny size of microplastics, our actions will profoundly impact our planet and leave a legacy of protected oral health.

Reference:
1. Kavery, C. S., Rao, A., Aparna, K. S., Jodalli, P. S., & Shenoy, K. R. (2023). Microplastic content of over-the-counter toothpastes systematic review. F1000Research, 12.
2. Lambert, S., & Wagner, M. (2018). Microplastics are contaminants of emerging concern in freshwater environments: an overview (pp. 1-23). Springer International Publishing.
3. Smith, B. J., Miller, R. J., & Hoover, D. J. (2022). Microplastics in dental floss: A widespread issue with potential implications for oral health. Environmental Science & Technology Letters, 9(10), 1225–1231.
4. Bråte, I. L. N., Blázquez, M., Brooks, S. J., & Thomas, K. V. (2018). Weathering impacts the uptake of polyethylene microparticles from toothpaste in Mediterranean mussels (M.galloprovincialis). Science of the Total Environment, 626, 1310-1318.

Ensuring a Healthy Workplace in Dental Medicine: The Role of Industrial Hygiene

By: José R. Rosa Martínez, BS

Industrial hygiene is a critical field that ensures workplace safety, is the science dedicated to identifying, evaluating, predicting, preventing, and controlling workplace hazards that may pose risks to the health of workers and the surrounding community. In the dental medicine field, industrial hygiene is of paramount importance to safeguard the well-being of dental professionals, patients, and visitors. That's why the focus is toward the workplace hazard in this field because dental professionals face a spectrum of risks in their environment. This includes threats such as physical, chemical, biological, and infectious diseases. In the upcoming sections of this article, we will explore these critical aspects in greater detail, specifically examining the challenges associated with noise levels in dental offices, the potential risks of injuries and infections within dental clinics, and the prevalence of musculoskeletal disorders among dental professionals.

In the field of Dental Medicine, various hazards pose risks to the health of both professionals and patients. These risks can be categorized into physical hazards, encompassing factors like noise, vibration, radiation, and ergonomic issues; chemical hazards, involving the use of substances such as mercury, dental amalgam, methyl methacrylate, and nitrous oxide. Other risks are biological hazards, which entail exposure to bodily fluids like blood and saliva, carrying the risk of infection transmission like HIV and hepatitis due to exposure to potentially infected materials and patients.

Noise Levels in Dental Office

One of the prevalent hazards in dental offices is excessive noise. The Occupational Safety and Health Administration (OSHA) stipulates a permissible exposure limit for noise at 90 decibels (dB) averaged over an 8-hour workday. Unfortunately, many dental offices surpass this limit. As an example, in the study by Kara, S., Köknel, T., & Kılıç, S. (2016), a cross-sectional survey was conducted at a dentistry college in the United Arab Emirates (UAE), about noise exposure and its impact on students, that were assessed using an integrated sound level meter. A structured interview questionnaire was employed to investigate hearing-related problems, noise annoyance, and students' awareness regarding noise issues. The findings revealed that noise levels in the college ranged from 65 to 79 dB with peak levels between 89 and 93 dB at both high and low frequencies.

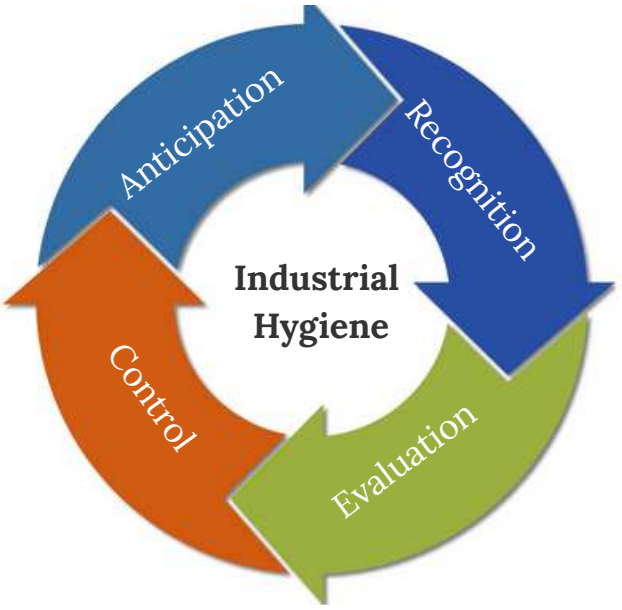

Figure 29: Principles of Industrial Hygiene. (Rosa, J.R, 2023)

Approximately 80% of the students experienced some level of noise annoyance, with 54% reporting hearing-related problems, and around 10% indicating a degree of hearing loss. As a recommendation, the use of sound-absorbent materials in the construction of dental clinics and laboratories is suggested to mitigate noise levels and improve the overall learning environment.

Injury and infection in dental clinics

Needlestick and sharp instrument injuries pose a common risk in dental practice, potentially exposing dentists to blood-borne pathogens, including hepatitis B virus, HIV, and others. In the study by Al-Zoughool, M., & Al-Shehri, Z. (2018), in a cross-sectional study conducted in Riyadh, Saudi Arabia, 515 dentists (274 males and 241 females) participated in a structured questionnaire survey assessing demographic factors, adherence to infection control practices, and previous exposure to injury and infection hazards. The findings indicated that dentists with greater professional experience had a significantly lower likelihood of reporting past injuries. Specifically, those with 10-20 years of experience and over 20 years had unadjusted odds ratios (ORs) of 0.48 (95% confidence interval [CI]) and 0.38 (95% CI), respectively. Moreover, a higher level of compliance with infection control procedures was associated with a reduced history of previous infections (OR: 0.31, 95% CI). Notably, the study did not find a correlation between occupational safety training and decreased injury or infection rates. The results underscore the importance of enhanced occupational safety knowledge and adherence to infection control practices in minimizing the risk of injury and infection among dentists, emphasizing the need for more targeted and specialized training in infection control and occupational safety for both practicing dentists and dental students.

Musculoskeletal Disorders in Dental Professionals (MSDs)

MSDs are a significant issue within the dental profession. They face an increased risk of developing this type of disease, such as carpal tunnel syndrome and low back pain often leading to reduced work capacity and early departure from the field. These disorders often result from repetitive motions, awkward postures, and the application of excessive force. The systematic review done by Abdolahi, M., Rahmani, M., & Ahmadi, S. F. (2020) aimed to provide a comprehensive summary of evidence regarding ergonomic interventions for the prevention of MSDs among dental professionals.

Figure 30: The Importance of Ergonomics In Dentistry. Photo retrieved from Decision Dentistry. https://decisionsindentistry. com/article/importance-ergonomics-dentistry/

The review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, conducting literature searches in May 2018 with an update in April 2019. A range of scientific databases and reference lists were utilized. Of the eleven studies included, four were considered high quality, and eight focused on preventative strategies. Among these, magnification loupes or prismatic spectacles were the primary subjects of ergonomic interventions in five studies, with the dental chair and dental instruments featuring in two and one study, respectively.

Three studies assessed ergonomic training. Importantly, all these interventions showed positive effects on the study outcomes, highlighting their potential to reduce the prevalence of MSDs and improve working postures. Notably, the review emphasizes the significance of prismatic spectacles as a valuable tool in preventing MSDs among dental professionals and suggests the need for further research on the role of ergonomics in MSD prevention within the dental field.

Prevention and Control of Workplace Hazards in Dental Offices:

Dental offices can promote a safe and healthy workplace by implementing measures addressing workplace hazards. They can reduce noise levels through engineering controls like soundproofing materials and noise-canceling headphones, while also providing hearing protection training for dental professionals. To minimize the risk of injuries and infections, emphasizing occupational safety knowledge and adherence to infection control practices is essential. Specialized training in infection control and occupational safety for dentists and dental students can further enhance prevention efforts. Lastly, addressing MSDs involves designing ergonomic dental workstations and tasks and providing training on maintaining proper posture and employing correct body mechanics to improve the well-being of dental professionals.

Figure 31: Representation of the Personal Protection Equipment (PPE) that is recommended to use when attending patients. Photo retrieved from Zhermack Dental Magazine. https://magazine.zhermack.com/en/hygiene-en/sources-of-infection-in-the-dental-sector-modes-of-transmission-and-recommended-ppe/

In conclusion, Industrial hygiene is indispensable in ensuring the health and safety of dental professionals, patients, and visitors within dental offices. By identifying and controlling workplace hazards through the practices mentioned above, dental offices can create an environment that is both safe and conducive to healthcare delivery.

Additional Resources:

- Occupational Safety and Health Administration (OSHA): Dental Industry
- American Dental Association (ADA): Center for Occupational Safety and Health
- National Institute for Occupational Safety and Health (NIOSH): Dental Industry

References:
1. Al-Zoughool, M., & Al-Shehri, Z. (2018). Injury and infection in dental clinics: Risk factors and prevention. Toxicology and Industrial Health, 34(9), 609-619. doi:10.1177/0748233718769553
2. Hugues, J. C. O. (2023, January 13). The importance of ergonomics in dentistry. Decisions in Dentistry. https://decisionsindentistry.com/article/importance-ergonomics-dentistry/ [Photograph].
3. Noise Levels, Noise Annoyance, and Hearing-Related Problems in a Dental Collage Kara, S., Köknel, T., & Kılıç, S. (2016). Noise levels, noise annoyance, and hearing-related problems in a dental college. Otology & Neurotology, 37(3), 319-324. doi:10.1097/MAO.0000000000001085
4. Prevention of Musculoskeletal Diseases and Pain among Dental Professionals through Ergonomic Interventions: A Systematic Literature Review Abdolahi, M., Rahmani, M., & Ahmadi, S. F. (2020). Prevention of musculoskeletal diseases and pain among dental professionals through ergonomic interventions: A systematic literature review. Ergonomics, 63(1), 103-119. oi:10.1080/00140139.2019.1667692
5. Sources of infection in the dental sector: Modes of transmission and recommended PPE. Infection in the dental sector: modes of transmission and PPE. (n.d.). https://magazine.zhermack.com/en/hygiene-en/sources-of-infection-in-the-dental-sector-modes-of-transmission-and-recommended-ppe/ [Photograph].

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Our team:

Dr. Lydia Lopez
Mentor

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Dr. Augusto Elias Boneta
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"The painting shows Dr Conrad Ackner in his surgery at Welbeck Street, treating a female patient, the artist's wife, Lady Lavery. Conrad Ackner, PhD, passed his LDS (License in Dental Surgery) in 1912 and registered with the Dental Board of the General Medical Council (GMC) in 1913. The Laverys were among many society and royal patients seen by Dr Ackner, including the author John Galsworthy and the King of Norway. We know his distinguished patient list because Dr Ackner's staff made a scrapbook of the employees and patients associated with this thriving practice. The scrapbook is still in the possession of Dr Ackner's family." By John Lavery's "The Dentist".

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Reference:
1. John Lavery's "the Dentist." Art UK. (n.d.). https://artuk.org/discover/stories/john-laverys-the-dentist