Lecture Synopses

6th Biennial Meeting

INTERNATIONAL ACADEMY OF ADHESIVE DENTISTRY

July 11-12, 2025

Washington Athletic Club, Seattle, WA, USA

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08:30	**Keynote: Bonding strategies for the compromised tooth surfaces**	**Prof. Junji Tagami (Tokyo, Japan)**
09:25	**Enhancing dental adhesives: New value through nanotechnology and vital pulp therapy**	**Prof. Hidehiko Sano (Sapporo, Japan)**
10:10	**Management of dental caries using remineralization therapy and adhesive material**	**Prof. Yasushi Shimada (Tokyo, Japan)**
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10:55	**AI - science, technology & adhesive dentistry innovation**	**Dr. Ken Hooi (Sydney, Australia)**
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15:15	**Conservative additive adhesive dentistry: From sealing initial lesions to reconstructions in severely compromised teeth**	**Dr. Jorge Aravena Diaz (Santiago, Chile)**
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16:25	**Poster Awards IAAD Assembly Closing Remarks**	**President-elect Dr. Jin-Ho Phark (Los Angeles, CA)**

Sponsors and Supports

Alireza Sadr, DDS, PhD

Associate Professor and Director of Operative Dentistry
Department of Restorative Dentistry
University of Washington School of Dentistry, Seattle, WA

Dr. Sadr received his DDS degree from the National University of Iran (SBMU) and completed his PhD and advanced training in operative dentistry at Tokyo Medical and Dental University under Prof. Junji Tagami in 2008. His research focuses on advanced dental adhesives and optical coherence tomography (OCT) for non-invasive clinical diagnosis and imaging. His passion is reconstruction of severely compromised teeth with structural adhesive direct restorations. His projects have received funding from governmental, industrial, and non-profit organizations in Japan and the United States. Dr. Sadr has authored 220 scientific articles which have been cited in literature over 10,000 times, presented nationally and internationally, and trained dentists in advanced operative dentistry. He currently serves as the director of operative dentistry and co-director of advanced digital dentistry at the University of Washington (UW), leads the B4T research laboratory, and practices dentistry in Seattle, WA. He is the president of the International Academy of Adhesive Dentistry and an active member of the American Dental Association, the International Association for Dental Research, and the academy of Operative Dentistry. Dr. Sadr has received the Dental Materials Career Award from the IADR for his contributions to dental materials science, and honored with the University of Washington Rothwell Teaching Award for innovative teaching. In the past years, has been invited as a keynote speaker at major dental conferences across the US, Australia, Europe, South America, Middle East and East Asia.

President's Welcome

On behalf of the University of Washington School of Dentistry, Department of Restorative Dentistry, I am pleased to welcome you to the publication of the 2025 International Academy of Adhesive Dentistry Proceedings. I am especially grateful to the many world-renowned experts—and dear friends—who have come together from over 20 countries to share their knowledge through lectures, discussions, and abstract submissions in this proceedings volume.

The 6th Biennial Meeting of the IAAD marks a pivotal moment in the Academy's history. In 2025, we officially established a legal identity and registered IAAD as a 501(c)(3) nonprofit organization in the United States. With this step, the Academy is reborn and rebranded in Seattle, entering a new era in its mission: to benefit the public by promoting adhesive dentistry.

The theme of this year's conference is **"Adhesive Dentistry in the Era of Advanced Technology."** A key message of this meeting is the ongoing importance of research and innovation in minimally invasive and adhesive dentistry. We are proud to highlight clinical techniques that have significantly benefitted from these technological advancements—including multi-surface direct restorations, digital workflows for indirect CAD/CAM ceramics, 3D-printed composites, treatment of structurally compromised teeth using fiber-reinforced composites, the latest developments in universal adhesives, and the growing role of artificial intelligence in our field.

I would like to take this opportunity to thank everyone who made this event possible—especially the organizing committee, composed primarily of members of my research lab at UW; our speakers who have traveled from near and far; the poster presenters; and, of course, all participants.

This meeting is being held at a special venue in downtown Seattle, and I hope you enjoy your stay at the Washington Athletic Club, one of the most historic clubs in the region.

As I pass the IAAD baton to our President-Elect, Dr. Jin-Ho Phark, I encourage you to continue supporting the Academy and to participate in our future meetings.

Sincerely,
Alireza Sadr
Seattle, WA
July 10, 2025

Junji Tagami DDS PhD

Professor Junji Tagami graduated from Tokyo Medical and Dental University(TMDU), achieving his DDS in 1980 and his PhD in 1984 mentored by Prof. Takao Fusayama and Prof. Hiroyasu Hosoda. In 1987 and 1988, he stayed and performed research with Prof. David Pashley. He was appointed to the Professor and Chair of Cariology and Operative Dentistry, Graduate School at TMDU in 1995. He is the Professor Emeritus after his retirement in 2021. He is a Professor Emeritus at TMDU, Professor at the Faculty of Dentistry, Chulalongkorn University, and the director of Aoyama Quartz Dental Clinic. He is a prolific author who has contributed more than 600 papers to peer-reviewed international journals in the fields of cariology, tooth-colored dental restorative systems, the bonding of materials to dental tissues. The development of the Optical Coherent Tomography (OCT) for dental diagnosis and application for laboratory material testing is one of his outstanding achievements in the recent years. Because of his contribution in dental research and education, he was awarded the Distinguished Scientist Award, Wilmer Souder Award, from IADR, and The President's Award of Japanese Association of Dental Science.

Bonding strategies for the compromised tooth surfaces

In the clinical situation, the direct bonding procedures are applied to the compromised tooth substances, such as the caries affected dentin and eroded dentin surfaces. The caries affected and eroded dentins were confirmed to exhibit the lower bond strength because of the reduced mineral contents at the bonded surfaces. The deproteinization of these dentinal surfaces with sodium hypochlorite or hypochlorous water were confirmed to recover the bonding, however, the anti-oxidant procedure, such as the application of sulfinate acid agent is required for the better conversion of the bonding resin. When the restorations are applied immediately after the tooth bleaching and endodontic treatments, the enamel and dentin surfaces are influenced by the byproducts of the bleaching agents and sodium hypochlorite. The residual byproducts at the tooth surface are recognized to affect the conversion of bonding resin, resulting in the reduced bond strength. For the recovery of bonding to these tooth surfaces, the bonded restorations are recommended to perform after some period of the bleaching and endodontic therapies. The application of the sulfinate agent, i.e. dual cure activator, is also effective for the better bonding for these tooth surfaces. Combining the sulfonate solution is recommended in various clinical situations.

Hidehiko Sano DDS PhD

Dr. Hidehiko Sano received his DDS in 1983 and PhD in 1987 from the Faculty of Dentistry at Tokyo Medical and Dental University (TMDU). He began his professional journey at TMDU, serving as hospital staff and then Assistant Professor in the Department of Operative Dentistry from 1987 to 1989. He also held a visiting academic position as Adjunct Associate Professor at the Medical College of Georgia, USA, from 1992 to 1993.

He returned to TMDU as a Lecturer in Operative Dentistry from 1995 to 1997. In 1997, Dr. Sano was appointed Professor in the Department of Restorative Dentistry at the Faculty of Dentistry, Hokkaido University, where he served until his retirement in 2023.

Dr. Sano's research focus was broad, from clinical cariology to dentin adhesion. His extensive works opened up many new fields of research including introduction of nanoleakage and microtensile bond testing at the adhesive interfaces, and mechanisms of biodegradation of the resin/dentin bonds. These are just a few honorable mentions from his long listed research achievements.

Dr. Sano continues to be actively involved in academic and professional service. He was named Professor Emeritus of Hokkaido University in 2023 and currently serves as a Part-Time Lecturer at TMDU (since 2022), Visiting Scholar at Hokkaido University (2024–), and Visiting Professor at Asahi University (starting 2025). He also serves as Counselor to the Hokkaido University Rowing Team and Dental Arrow Co., Ltd. (since 2023). Prof. Sano was the recipient of the Hollenback prize from the Academy of Operative Dentistry.

Enhancing Dental Adhesives: New Value Through Nanotechnology and Vital Pulp Therapy

It has been nearly 50 years since dentin bonding technology was introduced into clinical dentistry. During that time, adhesive materials have made remarkable progress, and numerous testing methods have been developed to evaluate their performance. Among these, the contribution of the Microtensile Bond Strength Test has been particularly significant, and the short-term bonding performance of recent adhesives is now sufficient for clinical use.

Building upon these improvements in bonding performance, we have been conducting research to add new value to dental adhesives. In this presentation, I would like to present the integration of Nanotechnology into adhesive dentistry and our ongoing challenges in Vital Pulp Therapy, based on our current research.

Supported by Grants-in-Aid for Scientific Research of JAPAN, #19K10123 (2019-2022), #22K09994 (2022-2025), #25K13014 (2025-2028)

Yasushi Shimada DDS PhD

Dr. Yasushi Shimada is currently a professor and chairman at Department of Cariology and Operative Dentistry, Institute of Science Tokyo. Yasushi graduated from Tokyo Medical and Dental University in 1987 and received PhD degree in 1922. From 1997 to 1999, he studied at National Institute of Standards and Technology, where he evaluated adhesive materials and co-developed a micro-shear bond test. From 2010, he was a member of the project to develop dental OCT system at TMDU. In 2021, he was appointed to the position of professor in Department of Cariology and Operative Dentistry at TMDU.

Management of dental caries using remineralization therapy and adhesive material

Dental caries is a ubiquitous condition caused by cariogenic microorganisms in dental biofilm that metabolize fermentable carbohydrates and produce acid to demineralize tooth structure. Disease dynamics involves a cyclical state of demineralization and remineralization, with lesions progressing when an imbalance favors demineralization. This imbalance occurs when the balanced microbial population shifts to acidogenic, aciduric and cariogenic population. Early-stage caries without cavitation can thus be treated with biofilm removal and therapy encouraging remineralization, a natural repair system for mineral loss. However, caries with cavitation involving heavily contaminated dentin by cariogenic bacteria usually requires invasive therapy to restore function and aesthetics. Direct composite restoration, which can satisfy both functional and aesthetic requirements with minimal loss of tooth structure, is the first choice for the management of cavitated caries. Accurate diagnosis of caries in early stages is essential for the success of such treatments. This presentation discusses management of caries using remineralization therapy and adhesive material.

Jack L Ferracane PhD

Jack Ferracane is Professor and Chair Emeritus of Oral Rehabilitation and Biosciences at Oregon Health & Science University, Portland, Oregon. Dr. Ferracane earned his Ph.D. in Biological Materials from Northwestern University. He is a founding fellow and past-President of the Academy of Dental Materials. He is a past-President of the American Association for Dental Research. He is the recipient of the Wilmer Souder Award from the Dental Materials Group of the IADR, the Founders Award from the Academy of Dental Materials, and the Hollenback Award from the Academy of Operative Dentistry. He is an honorary member of the American College of Dentists and the Oregon Dental Association. He is the inaugural Editor-in-Chief of the journal JADA Foundational Science, and is Editor-in-Chief of the journal Dental Materials. He has authored or co-authored several textbooks on dental materials and operative dentistry and has published extensively on biomaterials. His research has been funded by the NIH/NIDCR and private industry. He has also been actively involved in the establishment and operation of networks designed to conduct dental clinical research in the private practice setting.

A Historical Perspective on Dental Composite Restorative Materials

This review article will discuss the origin of resin-based dental composite materials and their adoption as potentially useful adjuncts to the primary material used by most dentists for direct restorations. The evolution of the materials, largely driven by the industry's response to the needs ofdentists, has produced materials that are esthetic, strong, and versatile enough to be used in most areas of the oral cavity to replace or restore missing tooth structures. Significant advancements, such as the transition from chemical to light-curing materials, refinements in reinforcing particlesto produce optimum polishing and wear resistance, formulating pastes with altered viscosities to create highly flowable and highly stiff materials, and creating materials with enhanced depth of cure to facilitate placement, will be highlighted. Future advancements will likely reflect the movementaway from simply being a biocompatible material to one that is designed to produce some type of beneficial effect upon interaction within the oral environment. These new materials have been called "bioactive" by virtue of their potential effects on bacterial biofilms and their ability to promotemineralization of adjacent tooth structures.

John Sorensen DMD PhD FACP

Sorensen is Professor, Department of Restorative Dentistry; Director, Biomimetics Biomaterials Biophotonics Biomechanics & Technology Laboratory; Director of Research, Graduate Prosthodontics Program at the University of Washington. The B4T team is actively engaged in materials science investigation, developing new diagnostic and analysis tools, R&D of digital workflows for conventional prosthodontics and implant surgical-prosthodontics and clinical trials. Dr. Sorensen is Past President of the Academy of Prosthodontics and a diplomate of the American Board of Prosthodontics. Over his career he has conducted 12 clinical trials on ceramic systems and implant prosthodontics, published over 95 research articles and chapters, and over 160 research abstracts. He has given over 150 invited lectures in 37 countries and over 300 lecture courses, hands-on programs and patient-treatment classes. Sorensen was awarded the 2018 Clinician-Researcher Award of Distinction by the American College of Prosthodontists and Distinguished Speaker Award by Greater New York Academy of Prosthodontics in 2017.

Contemporary advances in materials and technologies towards a completely digital workflow for CADCAM adhesive ceramic restorations.

Digital technology breakthroughs and innovations in digital material systems have transformed chairside fixed prosthodontics to levels implausible only 10 years ago. The specifically designed properties of glass ceramics, zirconia ceramics and polymers work synergistically with fabrication technologies to significantly enhance chairside fabrication and jumped into overdrive with ultra rapid milling systems and superfast sintering, creating restorations in a fraction of the time of even current efficient CADCAM systems.

Contemporary innovations in digital and adhesive materials, IOS and other digital technologies for chairside CADCAM with a completely digital workflow will be presented. Sorensen will review the latest research on digital materials and up to 7-year results on a clinical trial investigating clinical outcomes of a CADCAM ceramic system using a completely digital workflow with a new adhesive cementation protocol.

Frank Pfefferkorn DMD

Dr. Frank Pfefferkorn studied dentistry at the University of Ulm, Germany. After his residency in the Department for Esthetic Computer Restorations at the University of Zurich, he worked in the Clinic for Paediatric Dentistry of Schaffhausen. In 1995 he joined DENTSPLY DeTrey and was in charge of clinical aspects of research and development projects as Clinical Research Manager as well as the European Professional Service until 2001. After his time as SAP consultant for hospital information systems and business warehouse until 2003, he joined the R&D department of DENTSPLY DeTrey as Manager Scientific Service being responsible for external in vitro research. Since 2015 he has overseen external in vitro and clinical studies as well as user evaluations and serves currently as Senior Clinical Research Manager at the Konstanz site of Dentsply Sirona.

Priming and Bonding in one bottle - 30 years of why and how

Adhesive dentistry became the fundamental basis for modern dentistry. This talk exploits 30 years of developing steps to achieve less and less technique sensitive bonding systems provided in one bottle. It explains why at a certain point in time decisions for changes were taken and will show possible features in the future.

Alan Atlas DMD

Dr. Alan Atlas maintains a full-time private practice in Philadelphia, Pennsylvania, with a focus on comprehensive and esthetic dentistry. He has served on the faculty at Penn Dental Medicine for 26 years, where he holds a dual appointment as Clinical Professor of Restorative Dentistry in the Departments of Endodontics and Preventive & Restorative Sciences.

Dr. Atlas is the Director of Restorative Microscopy at Penn Dental Medicine, where he leads the only curriculum-based dental school course worldwide dedicated to precision restorative dentistry and enhanced chairside ergonomics using the dental microscope.

An internationally recognized lecturer and researcher, Dr. Atlas brings a unique blend of academic insight and private practice experience to his work. His evidence-based clinical protocols and workflows are widely respected and have been presented across the globe, including in Japan, Africa, Australia, the Middle East, China, South Korea, Europe, and at all major dental conferences throughout the United States.

Revisiting the Class II Posterior Composite Workflow: Evidence-Based Procedural Techniques to Enhance Clinical Outcomes

The direct Class II posterior composite restoration remains one of the most technically demanding procedures in restorative dentistry. Despite its prevalence, a lack of standardized, evidence-based protocols continues to contribute to outcomes that often underperform in longevity compared to traditional amalgam restorations. This presentation integrates new research findings with innovative clinical workflow methods designed to improve predictability and long-term success. Techniques will be demonstrated through high-definition dental microscope video, providing a detailed, real-time perspective to support clinical understanding and implementation.

Grant Chyz DDS

Dr. Chyz earned his D.D.S. degree in 1983 from the University of Michigan and established a clinical practice in Seattle, Washington. Over the years, his practice evolved to emphasize tooth-preserving biomimetic concepts. Dr. Chyz first laminated Ribbond to internal tooth structure in 1999, using a technique that has recently been named the "Dr. Chyz Technique" by Ribbond, giving him a unique, long-term perspective on the value of fiber lamination to augment direct restorations. He is a passionate advocate for structurally sound, tooth-preserving dentistry.

In 2024 Dr. Chyz retired from private practice. He continues to lecture, teach a selection of adhesively focused classes at University of Washington, and collaborate on research related to optimizing structural restorative dental techniques in Dr. Alireza Sadr's B4T research lab.

40 Years of treating structurally compromised teeth

For individual teeth, restorative choices are driven by many factors, but more than anything else, it is by the presence or absence of cracks and/or endodontic treatment, and the amount of remaining tooth structure. By carefully managing tooth structure, and with the use of composite resin, strategically laminated continuous UHMWPE fiber and discontinuous short fiber composite, we can create a new class of direct restoration that better manage tensile forces, resists and deflects cracks and lessens the effects of polymerization shrinkage on remaining tooth structure. These techniques have changed the way I see teeth. I am looking forward to sharing these concepts with you.

Jae Seon Kim DDS MSD

Dr. Jae Seon Kim graduated from Yonsei University College of Dentistry in Korea and received his certificate in Prosthodontics from University of Washington. He is a board-certified prosthodontist practicing in Seattle. Dr. Kim taught at the Ronald Goldstein Center for Esthetic and Implant Dentistry in Augusta University and is an affiliate assistant professor at University of Washington.

Reconstructing the Eroded Dentition with Bonded Ceramics

Abstract : The percentage of adults with severe tooth wear can vary widely (3% at the age of 20 to 17% at the age of 70.) When patients display signs of occlusal dysfunction in addition to dental erosion, it can lead to restorations breaking prematurely, unsatisfied patients, and frustrated clinicians. This lecture will point out the risk factors in treating patients with eroded dentition and lay out the treatment planning process and utilize bonded ceramics to reduce restorative failures.

YenWei Chen DDS MSD

Dr. Yen-Wei Chen holds a Doctor of Dental Surgery degree from Taipei Medical University (1998), a Master of Science in Dentistry degree and Certificate in Prosthodontics from the University of Washington (2008). Dr. Chen's research interests are in the area of all ceramic systems and the application of CAD/CAM technology in the restorative dentistry. Dr. Chen is a member of the American Academy of Fixed Prosthodontics, American College of Prosthodontists, and board-eligible for the American Board of Prosthodontics. Dr. Chen's clinical interests focus on esthetics and implant restorative dentistry. He currently maintains a part-time private practice in Seattle with his wife, Dr. Kanako Nagatomo. Dr. Chen has presented his research and clinical work at several scientific meetings both nationally and internationally. He has authored numerous articles in various peer reviewed journals and coauthored a book chapter. Since 2012, Dr. Chen has been repeatedly acknowledged by the School of Dentistry classes for contributing in teaching at the University of Washington.

Digital workflows for adhesive ceramic restorations

The minimally invasive concept has become the main stream of the contemporary dentistry. The use of CAD/CAM technology with advanced adhesive techniques permits efficient workflows, less invasive procedures and better esthetic outcomes. Optimal longevity can be achieved by improving the bonding integrity on the adhesive interfaces through reliable bonding techniques and proper material selection. This presentation provides a systematic and scientific approach for enhancing bonded esthetic restorations based on original research data with special emphasis on clinical applications. The capabilities and the limitations of current intra-oral scanners and chair-side CAD/CAM systems will be discussed. The innovative digital workflow to fabricate ceramic restorations from digital designing, 3-D printed model generation to milling process will be introduced. Based on these considerations, the University of Washington program for implementation of digital dentistry for pre-doctoral training will be discussed.

Ken Hooi BDS MDSc

Dr. Hooi is an Australian Prosthodontist; BDS 1992, GradDipClinDent (Oral Implants) 2003, MDSc 2009, University of Sydney.

Dr Ken Hooi's executive roles include Immediate-Past Academy of Australian and New Zealand Prosthodontists Scientific Chair 2022-24; Australian Prosthodontic Society Federal President 2013-15; Sydney University Continuing Education in Dentistry Chair 2015-19 and Australasian Ossoeintegration Society Federal Executive Member 2004-05.University teaching 1993-2019, including various roles with Sydney Dental School, Charles Sturt University and James Cook University. A director of CREED CE, providing professional development services for Australian Dentists.

Fellowships by invitation FPFA 2003, FICD 2021 and FAANZP 2024.Certificate in Data Science and Artificial Intelligence with the University of Technology Sydney (April 2023).

Authored a Chapter in textbook, "Oral Rehabilitation: A Case-Based Approach" (Klineberg 2012, Wiley). First and Corresponding Author et al, “The Role of Artificial Intelligence in Dentistry and Teeth Whitening”, accepted for publication with The American Journal of Dentistry in July 2024. Commenced Reviewer role for Journal of Prosthodontics in 2025.2025 appointment with University of Washington School of Dentistry, Seattle USA, as Affiliate Assistant Professor, and Convenor for their new undergraduate elective program, "Artificial Intelligence in Dentistry".

AI - Science, Technology & Adhesive Dentistry Innovation

In January earlier this year, FDI World Dental Federation published its Policy Statement, “Artificial intelligence in dentistry”. Its recommendations for dental professionals comprised acquiring a basic literacy of AI, critically appraising the evidence supporting an AI application, and employing AI applications as assistance systems and safeguard against automation bias. FDI also recommend that dental educators, researchers, developers, policy makers and payers use the core curriculum of AI for dental professionals to inform the development of undergraduate or postgraduate training programmes. The primary aim of this presentation is to equip all dental professionals with essential scientific, technological and governance knowledge to support their professional obligations and personal curiosities with confidence and clarity Via pairing data science and clinical science concepts, attendees will acquire competencies in the understanding of AI’s role in diagnostics, patient care, workflow optimisation, as well as ethical frameworks available for the profession. It offers a strong start in AI literacy and a comprehensive perspective on integrating AI responsibly. Participants will as explore published and commercial AI applications in adhesive clinical dentistry and research.

Sami Dogan DDS DMD

Dr. Sami Dogan is an Associate Professor of Restorative Dentistry and a Prosthodontist at the University of Washington School of Dentistry. His academic and clinical focus includes preventive dentistry, prosthodontics, restorative dentistry, and dental implants. Dr. Dogan leads research on in vivo mineralization and developing and evaluating novel remineralization protocols for clinical application. Dr. Dogan is a member of several professional organizations, including the International Association for Dental Research and the German Society of Dental Oral and Craniomandibular Sciences.

Biomimetic Remineralization: Harnessing Amelogenin-Derived Peptides for Functional Dental Tissue Repair

Amelogenin-derived peptide (ADP) mineralization represents an innovative biomimetic approach for dental hard tissue repair. Biomimetic ADP peptides, modeled after functional domains of the enamel matrix protein amelogenin, have demonstrated the ability to guide and catalyze the formation of hydroxyapatite-like mineral layers on demineralized enamel, dentin, and root surfaces, closely mimicking natural mineralization processes. In addition to enhancing structural repair, recent findings indicate that ADP-guided remineralization can also contribute to a visible whitening effect by supporting the formation of new, well-organized mineral layers that improve enamel brightness. We will discuss recent evidence showing that biomimetic ADP-guided remineralization achieves superior hardness compared to sound dentin, maintains strong adhesion and durability under thermal and mechanical stress, and offers a dual benefit of both tissue repair and esthetic improvement. Clinical implications for the long-term management of caries, dentin hypersensitivity, whitening, and periodontal regeneration will be highlighted, along with current limitations and future directions for biomimetic peptide-based remineralization therapies.

Amir Ghasemi DDS MSD

Dr. Amir Ghasemi is a Full Professor and the Head of the Department of Restorative Dentistry at Shahid Beheshti University of Medical Sciences, Dental School in Tehran, Iran. He has dedicated over three decades to clinical practice, academic leadership, and research in the field of operative and adhesive dentistry.

Dr. Ghasemi earned his Doctorate in Dental Surgery (DDS) from Tehran University of Medical Sciences in 1989. He went on to complete a Master of Science in Restorative (Operative) Dentistry at Shahid Beheshti University of Medical Sciences in 1994. He further advanced his academic training as a guest researcher in Adhesive Dentistry at Tokyo Medical and Dental University (TMDU) from 2000 to 2001.

In addition to his academic appointments, Dr. Ghasemi has played a key role in shaping national dental education and policy. He served as a member of Iran's National Board of Restorative Dentistry from 2010 to 2021, including as President of the Board from 2016 to 2021.

Dr. Ghasemi has authored more than 60 international scientific publications and is widely recognized for his contributions to the advancement of adhesive and restorative dental techniques.

Philosophy of adhesion

This presentation is divided into different parts. First, I will discuss the importance of adhesion in various fields, including nature, industry, and health. Simple examples will be presented to illustrate the impact of adhesion, particularly cellular adhesion, in maintaining health, protecting against disease, and its role in evolution.

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In the second part, I will present our department's research in adhesive dentistry, focusing especially on comparisons of bond strength across different materials, techniques, and modifications. Clinical cases demonstrating the successful application of adhesive procedures will also be showcased.

Finally, a brief review of the current literature will be discussed to highlight factors related to composition and manipulation techniques that enhance the durability and performance of adhesive systems.

Sema Belli DDS PhD

Dr Sema Belli graduated from Marmara University, Istanbul, Türkiye with DDS, and received her PhD degree in the Department of Operative Dentistry from Selçuk University, Konya, Türkiye. She worked at Tokyo Medical & Dental University and Medical College of Georgia as visitor researcher. She has published and lectured extensively on dental composites, adhesives, glass or polyethylene fibre-reinforcement restorations, conservative restoration of extensive cavities, restoration of endodontically treated teeth, post and core restorations, finite elemental stress analysis, bonding to the endodontic surfaces, biomimetic restorative dentistry, stress reduced restorations (by using fibres) and biocompatibility of dental materials. Dr Belli worked as a board member at Continental European Division of IADR (CED-IADR) (2017-2021) and board member at the Turkish Endodontic Society. She worked as ERASMUS Coordinator of Dental Faculty for more than 10 years. Now she is a full time professor in Faculty of Dentistry, Selçuk University. Selçuk University, Faculty of Dentistry is the first and only faculty that offers Biomimetic Restorative Dentistry Course to undergraduate students in Türkiye.

Biomimetic and Sustainable Restorations: A Patient-Centered Future

Today's dental care must extend beyond technical proficiency—it must embrace empathy, inclusivity, and a deep commitment to minimally invasive, environmentally conscious treatment. Adhesive dentistry, at the heart of this movement, is not merely a technique but a philosophy that empowers clinicians to restore more than just teeth. It helps rebuild trust, confidence, and comprehensive well-being for patients across all life stages. Through esthetic, durable, and tailored restorations, biomimetic approaches promote oral health while respecting the natural structure of teeth. This conference explores the transformative potential of biomimetic and sustainable restorative dentistry in meeting the needs of the patients and will highlight how the integration of clinical excellence with ecological responsibility positions dentistry as a force for both individual and planetary health. Participants will gain insight into materials and methods that align with ethical and sustainable care, underscoring the evolving role of the dental professional in a world that increasingly values holistic and future-forward solutions.

Hassan Hikmat DDS

Dr. Hasan Hekmat graduated from the College of Dentistry at Al-Anbar University in Iraq in 2016. He holds a professional diploma in Esthetic Restorative Dentistry and is currently pursuing advanced studies in Minimal Intervention Restorative Dentistry at King's College London.

Dr. Hekmat plays an active role in advancing dental education and research in the region. He serves as the Head of the Scientific Committee for both the IDEX Iraq Congress and the Laith Team Dental Academy. He is also the founder of the International Restorative Symposium (IRS), a platform dedicated to promoting excellence in restorative dental practices.

His primary area of interest lies in high-quality microscopic restorative dentistry, with a focus on precision, esthetics, and minimally invasive techniques.

Engineering proximal posterior restorations

Restoring posterior teeth is about 80% of our daily practice, and most cavities are CL II type, so it is all about restoring a healthy and functional proximal anatomy, which means creating correct sizes, profiles and, most importantly, height. The proximal ridges are, in fact, the guide plane for occlusal movements. So, understanding the matrix and tools that is being used is the key for a successful posterior restorations. This lecture is a summery for the CL II types and the modern concept for the matrix selection.

Jorge Aravena-Diaz DDS

Dr. Aravena received his degree in Dentistry in the University of Chile, then his specialty degree in oral rehabilitation in the same University. After dedicating a few years in Dental School as an assistant professor he obtained a Master degree in Pedagogy. He continued his education with postgraduate diplomas in adhesive dentistry and clinical cariology. Has been teaching in dental schools and practicing adhesive restorative dentistry for 18 years in Santiago Chile, and since 2018 with his team he has been directing a private contining education academy called AOS Academy in Chile, promoting conservative and adhesive dentistry.

Conservative additive adhesive dentistry: From sealing initial lesions to reconstructions in severely compromised teeth

Uncontrolled caries disease is a process that affects tooth structure over time, unleashing a destruction and restorative spiral of teeth. It is important to learn about the difference between the diagnose of the disease based on caries risk and the visual and tactile detection of caries lesions, to effectively create solutions to -first- be able to control the disease, and then to create modern, conservative, additive, superficial, and adhesive solutions to different stages of the caries lesion and the consecutive tooth destruction.

Jorge O'Brien Opazo DDS

Dr. Jorge O'Brien Opazo earned his DDS from the Universidad de Chile in 2005. He completed his specialty training in Oral Rehabilitation at the same institution in 2010. He also holds diplomas in Implant Prosthetics from Universidad de Chile and in Teaching for the Health Professions from Universidad Diego Portales.

With a strong interest in biomimetic dentistry, Dr. O'Brien has completed advanced training at The Alleman Center for Biomimetic Dentistry in both 2018 and 2022. In 2022, he also undertook an internship with Dr. Sadr at the B4T Lab, University of Washington School of Dentistry.

Dr. O'Brien maintains a private practice at Clínica Dental Nueva Panorámica in Santiago, Chile. He is Co-Director of the Diplomas in Adhesive and Biomimetic Dentistry at Universidad Diego Portales (until 2024), and a lecturer at AOS Academy. He is also a frequent speaker at national and international dental conferences.

Step by Step Tooth reconstruction. From root to enamel with a conservative approach

Clinical protocols supported by evidence for replacing, with a conservative approach, the root, the dentin and the enamel in posterior teeth. Emphasizing on tooth preservation and reinforcement in vital and non vital cases.

Poster Session and Competition Abstracts

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2 (11G)	Full-mouth adhesive rehabilitation of a moderate dental attrition case with reduced vertical dimension	Clinical Report/ Clinician	Ahmad Alkhazaleh	OHSU, Portland, USA
3 (120)	Reconstruction of Upper Incisors According to Golden Coefficient	Clinical Report/ Clinician	Anna Bodakva	APOLLONIA Dental clinic-studio, Poltava, Ukraine
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G (127)	Survival of Molar Teeth in Need of Complex Endodontic Treatment	Clinical Report	Brendan Lopez	Seattle, WA, USA
10 (128)	Long-term Bond Strength of Purely Self-cured Experimental Adhesive	Laboratory Research	Barbara Rietzler-Lins	Ivoclar Vivadent, Schaan, Liechtenstein
11 (130)	Dentin Bonding Stability, Enzymatic, and Antibiofilm Activities of Flavonoid-Containing Adhesives	Laboratory Research	Beatriz Ometto Sahadi	State University of Campinas, Piracicaba, Brazil
12 (131)	Evaluation of Deep Class II Composite Placement Techniques Using OCT and Microtensile Bond Strength Testing	Laboratory Research/ Student Scientist	Megha Rao	University of Washington, Seattle, USA

13 **(132)**	Optimizing Ultra-high Molecular Weight Polyethylene Bonding: Comparative Evaluation of Surface Treatment Effects	Laboratory Research/ Student Scientist	Nafiseh Najmafshar	University of Washington, Seattle, USA
14 **(133)**	Enhanced Bonding to Caries-Affected Dentin Using an Isocyanate-Based Primer	Laboratory Research/ Student Scientist	Kai Tang	Fourth Military Medical University, Xi'an, Shaanxi, China
15 **(134)**	Porcelain Palatal Veneer Restoration for Reinforcement of Immature Anterior Teeth after Trauma	Clinical Report	Hyun-Jung Kim	Kyung Hee University, Seoul, Korea
16 **(135)**	Effect of Temperature on Heat Generation during Composite Photopolymerization	Laboratory Research	Chang-Ha Lee	Seoul National University, Seoul, Korea
17 **(136)**	Adhesive Reconstruction of Structurally Compromised Dentition	Clinical Report/ Clinician	Hira Khalid	SeaTac, WA, USA
18 **(137)**	Biaxial Flexural Strength of Novel CAD/CAM Resin-Based Definitive Materials	Laboratory Research	Jin-Ho Phark	University of Southern California, Los Angeles, CA, USA
19 **(138)**	Sulfinate Salt Reverses Bond Strength to Bleached Enamel	Laboratory Research	Pimduean Sivavong	Chulalongkorn University, Bangkok, Thailand

Abstract ID: 118

Algorithm for Systemic Restoration of Occlusion with Composites

**Serhiy Radlinsky | APOLLONIA Dental clinic-studio, Poltava, Ukraine*

Category: Clinical Report

Keywords: dental restoration, hybrid composite, nanocomposite, tooth wear

Objective: The prevalence and intensity of tooth wear is increasing, and therefore preventive restoration of lost dental tissues using adhesive direct restoration with composite is relevant. The presence of point-exposed dentin is the limit beyond which tooth wear is considered a pathology.

Methods: We have developed and have been using for 25 years an algorithm for restoring occlusion with composites in the direct freehand technique by restoring the anatomical shape of all teeth. When the posterior teeth have a fully restored shape and are in contact with the supporting cusps with the antagonists, they will form the VDO that was lost due to tooth wear. Minimal invasive tooth preparation involved removing sclerosed dentin to a depth up to 1 mm and cracked enamel with the formation of a beveled edge. To find the lost anatomical shape, the shape of the preserved enamel surface, the topography of the dentin-enamel junction, tooth neck, standard tooth sizes, an occlusal mirror, and a caliper serve as guidelines.

Results: Restoration of occlusion by restoring the anatomical shape of all teeth takes place in 4 visits: 1st visit - initial diagnostics (registration of bite and muscle balance), making an insulating day and night guard for the lower dentition. 2nd visit after 1 month - restoring the anatomical shape of all upper teeth (first canines, then posterior teeth, finally incisors). 3rd visit after 1 month - restoring the anatomical shape of all lower teeth (posterior teeth, canines, incisors), making a new day and night insulating guard for the lower dentition. 4th visit after 1 month - final diagnostics (registration of bite and muscle balance), precision correction of occlusion. Systemic restoration of occlusion lasts 3-5 months, and restoration should be for all teeth without exception.

Conclusion: The restored anatomical shape of the teeth, which is primary, allows finding the secondary elements that are lost due to tooth wear, such as occlusion, bite, VDO, TMJ position, muscle balance and posture. Composite restoration of occlusion allows for preventive restoration of teeth when functional disorders are still minor.

Funding/Conflict of Interest: None.

Abstract ID: 119

Full-mouth Adhesive Rehabilitation of a Moderate Dental Attrition Case with Reduced Vertical Dimension

**Ahmad Alkhazaleh | OHSU, Portland, USA*

Category: Clinical Report

Competition: Clinician Award

Keywords: adhesive, lithium disilicate, resin composite

Objective: Dental wear can lead to functional and esthetic complications, including occlusal disharmony, dentin hypersensitivity, and a diminished quality of life. In this report, I present a minimally invasive adhesive rehabilitation approach to restoring vertical dimension using a combination of direct and indirect restorations.

Methods: A middle-aged female visited the Operative Dentistry Department seeking conservative treatment for her collapsed bite and unesthetic smile. A comprehensive radiographic and clinical examination revealed moderate to severe attrition of the anterior and posterior teeth, traumatic occlusion, and a unilateral left posterior crossbite, leading to impaired phonetics, dentin hypersensitivity, and an aged appearance. The case was classified as a Prosthodontic Diagnostic Index (PDI) Class III dentate patient with healthy periodontal tissues.
The ideal incisal show at rest was determined clinically, incorporating the patient's feedback. PVS impressions were taken, and study casts were mounted on a semi-adjustable articulator and then scanned. A digital wax-up was created using 3Shape software and then printed to visualize the proposed changes, including a 3-mm posterior bite opening. A chairside mock-up was performed to confirm the patient's approval and obtain informed consent. During the first session, polychromatic layering of the maxillary and mandibular anterior teeth was performed using a supranano composite (Estelite Omega, Tokuyama) in Dentin A2, Enamel A1, Translucent, and Semi-translucent MW opacity, under rubber dam isolation, following a three-step etch-and-rinse adhesive protocol (Optibond FL, Kerr). Provisional bisacryl restorations were placed on the posterior teeth using a clear mold of the digital waxup with a spot etch procedure. Next, all existing crowns were removed, and core build-ups were placed as needed. The maxillary and mandibular posterior teeth were then prepared for minimally invasive lithium disilicate onlays and crowns, followed by final impressions. The restorations were then tried in and bonded under rubber dam isolation. Lastly, a night guard was delivered, and postoperative instructions were provided.

Results: At the 36-month follow-up, the restorations remained well maintained, and the patient remained satisfied.

Conclusion: A combination of minimally invasive direct and indirect restorations can effectively and predictably manage cases of moderate attrition. Adhering to the appropriate adhesion protocol and maintaining proper field control are essential for successful treatment.

Funding/Conflict of Interest: None

Abstract ID: 120

Reconstruction of Upper Incisors According to Golden Coefficient

**Anna Bodakva | APOLLONIA Dental Clinic-Studio, Poltava, Ukraine*

Category: Clinical Report

Competition: Clinician Award

Keywords: Keywords: Dental restoration, composite resins, nanocomposites.

Objective: In this clinical case we demonstrate the key aspects of the step-by-step planning of the reconstruction of the upper incisors, with the help of calculation. The appearance of the teeth before the reconstruction shows defects of wear of the incisal edges and spaces between teeth.

Methods: The calculation of the dental arch was carried out to determine the prediction of the size of the crown width of the 4 incisors, using the "Golden Coefficient" (GC) by S.Radlinsky. We use a dental caliper for measurements, and we calculated according to certain formulas.

Results: We made a calculation:

1. We determined the width of each incisor in mm (5,9; 9,0; 9,0; 5,9). Lateral incisors are narrower than standard, central incisors are wider. The sum of the width of four incisors is 29,8mm.

2.We determined the length of the space corresponding to 4 incisors (8,1 + 9,2 + 9,2 + 6,5 = 33,0 mm). Taking into account symmetry for the 4 incisors,1 mm was added mesially to the width of tooth 13. The length that corresponds to 4 incisors is 32,0 mm (33,0 mm–1 mm = 32,0 mm). The surplus space is 2,2mm.(32,0mm-29,8mm=2,2mm).

3. We determined the sum of the coefficients corresponding to the 4th incisors. Coefficient 1 corresponds to lateral incisors. Coefficient 1.3 corresponds to central incisors. (1 + 1,3 + 1,3 + 1 = 4,6).

4. We determined the custom width of the lateral incisors by dividing the length of the sextant by the sum of the GC (32,0 mm: 4,6 = 6,9 mm).

5. We determined the custom width of the central incisors by multiplying the width of the lateral incisor by the GC (6,9 mm x 1,3 = 9,0mm) The lateral incisors were restored first, then the central ones under the control of the caliper. As a result, the contact between central incisors shifted slightly to the right.

Conclusion: The reconstruction was carried out taking into account the dimensions according to individual calculations according to the "Golden Coefficient". As a result, all incisors were restored proportional and symmetrical, as is the "Golden Ratio".

Funding/Conflict of Interest: None.

Abstract ID: 121

Reconstruction of Lower Incisors According to Golden Coefficient

**Yuliia Bodakva | APOLLONIA Dental Clinic-Studio, Poltava, Ukraine*

Category: Clinical Report

Competition: Clinician Award

Keywords: Keywords: Dental restoration, composite resins, nanocomposites.

Objectives: Tooth wear, spaces between teeth, and vestibular position of teeth 41 and 31 cause aesthetic and functional problems. After orthodontic treatment we performed reconstruction of lower incisors. This is an increase size of the tooth crowns while preserving the proportions between them. In this case we demonstrate the key aspects of the planning of the reconstruction of the lower incisors through using calculation.

Methods: The calculation of the dental arch was carried out to determine the prediction of the size of the crown width of the 4 incisors, using the "Golden Coefficient" (GC) by S.Radlinsky. We used a dental caliper for measurements, and we calculated according to certain formulas.

Results: We made a calculation:

1. We determined the width of each incisor in mm (5,3; 4,8; 4,8; 5,2). All incisors are narrower than standard. The sum of the width of four incisors is 20,1 mm. (5,3 + 4,8 + 4,8 +5,2 =20,1). 2. We determined the length of the frontal sextant from canine to canine (21,8 mm) (5,7 + 5,2 + 5,7 + 5,2 = 21,8). The surplus space is 1,7 mm (21,8 - 20,1 =1,7). 3. The GC of the width of the lower lateral incisors to the central incisors is 1,1. Coefficient1 corresponds to central incisors. The sum of the GC is 4,2 corresponding to the 4 incisors (1,1+1+1+1,1 = 4,2). 4. We determined the custom width of the central incisors by dividing the length of the sextant by the sum of the GC (21,8 mm: 4,2 = 5,2 mm). 5. We determined the custom width of the lateral incisors by multiplying the width of the central incisor by the GC (5,2 mm x 1,1 = 5,7 mm).

After the calculation, restoration was carried out. The lateral incisors were restored first, then the central ones under the control of the caliper.

Conclusion: The reconstruction of the lower incisors was carried out considering the dimensions according to individual calculations according to the "Golden Coefficient". As a result, all incisors were restored proportional and symmetrical, as is the "Golden Ratio".

Funding/Conflict of Interest: None.

Abstract ID: 122

Adaptation and Bonding of Bulk Fill Composites in Deep Preparations

**Juman Al-Haddad[a] | Andre V Ritter[a] | Alireza Sadr[a] | [a]University of Washington School of Dentistry, Seattle, WA USA*

Category: Laboratory Research

Competition: Student Scientist

Keywords: MTBS, cavity, OCT, adhesive, bonding, bulkfill, composites, preparation

Objectives: Polymerization shrinkage may cause gap formation between the cavity floor and bulk fill composites, depending on the polymerization mechanism. This study investigated the adaptation and bond strength of a newly developed dual cure composite in 4-mm deep preparations compared to commercially available products using optical coherence tomography (OCT) and microtensile bond strength (MTBS).

Methods: Six bulk fill composite products were tested; Bulk EZ Plus prototype (BEZP, Zest), Surefil SDR Flow+ (SDRF, Dentsply), Surefil One self-adhesive capsule (SONE, Dentsply), Filtek One (FTON, 3M), Hyperfil (HYPF, Parkell), and Sonicfill 3 (SNCF, Kerr). Standard composite molds 4-mm in depth were used to observe and score separation of the bonded composite during the polymerization process under OCT (Octina prototype, Yoshida Dental). Cavity preparations 3×3×4 mm in dimensions were prepared in extracted posterior human teeth to conduct the MTBS test with each of the composites placed using ScotchBond Universal (3M) adhesive. OCT data was analyzed by Mann-Whitney U nonparametric tests while MTBS data was analyzed by one-way ANOVA with Bonferroni correction at 0.05 significance level.

Results: OCT data showed that the dual-cure composites BEZP had lowest gap formation during polymerization followed by HYPF compared to all other groups ($p<0.05$). SONE selfadhesive demonstrated the highest debonding from the cavity floor ($p<0.05$). There was no difference between SDRF and FTON ($p>0.05$) which had 10% to 50% debonding from the cavity floor. For MTBS analysis excluding the pretest failures due to debonding, SONE showed the lowest bond strength, followed by SNCF both of which were significantly different from SDRF ($p<0.05$). There was no statistically significant difference among other groups ($p>0.05$).

Conclusion: The dual-cure bulk fill composites tested exhibited significantly better adaptation and less gap formation than the light cured ones. The difference was not reflected in the bond strength values using the universal adhesive used in the current study. The self-adhesive composite de-bonded frequently in both experiments.

Funding/Conflict of Interest: None.

Abstract ID: 123

Microshear Bond Strength of Resin Cement to CAD/CAM and 3D-Printed Composites

**Fernando Antonio Reis Laurino[a] | Andre Vicente Ritter[a] | Marcelo Munhoes Romano[b] | Paulo Francisco Cesar[b] | Alireza Sadr[a] | [a]UW, Seattle, USA | [b]USP, São Paulo, Brazil*

Category: Laboratory Research

Keywords: Microshear bond strength; Resin cement; CAD/CAM; 3D-Printed composites.

Objective: This study evaluated the microshear bond strength (MSBS) of an adhesive resin cement to Lava Ultimate (CAD/CAM) and 3D-printed composites.

Methods: Lava Ultimate CAD/CAM blocks (3M) were sectioned using a low-speed diamond saw. For 3D-printed composites, C&B MFH (NextDent, Netherlands), Nanolab 3D (Wilcos, Brazil), and VarseoSmile CrownPlus (Bego, Germany) were fabricated as 12-mm diameter, 1-mm thick disks using a digital light processing (DLP) printer. The specimens were sandblasted with 50 µm alumina particles at 2.5 bar for 10 seconds at a 10-mm distance before bonding with Panavia SA Cement Universal and Clearfil Universal Bond Quick 2 (Kuraray Noritake Dental). Microshear bond strength (MSBS) was measured using the wire loop technique at a 1.0 mm/min crosshead speed in a universal testing machine (Bisco, USA). The data were analyzed using one-way ANOVA followed by Bonferroni post-hoc tests (alpha = 0.05).

Results: Lava Ultimate exhibited significantly higher MSBS (29.7 ± 5.0 MPa). Nanolab 3D demonstrated the lowest MSBS values, whereas no significant difference was observed between C&B MFH and VarseoSmile CrownPlus ($p > 0.05$). The bonding performance varied depending on the CAD/CAM material performed.

Conclusion: The CAD/CAM composite type influenced the MSBS for permanent cementation of restorations. The adhesive resin cement showed better bonding to the milled CAD/CAM composite block than the 3D-printed composites.

Funding/Conflict of Interest: None.

Abstract ID: 124

Indirect Bonded Porcelain Restoration for Traumatized Teeth and Peg Laterals

**Eun-young Hur[a] | Hyun-Jung Kim[a] | Duck-Su Kim[a] | Kyoung-Kyu Choi[a] | [a]Kyung Hee University Dental Hospital, Seoul, Korea*

Category: Clinical Report

Keywords: Indirect bonded porcelain restoration, dental trauma, minimal invasive, peg lateralis

Objective: To describe a minimally invasive approach for the restoration of traumatized anterior teeth (#12,11,21) and peg laterals (#12, #22) using bonded porcelain restorations, with an emphasis on tooth preservation and esthetic outcomes.

Methods: A multidisciplinary, conservative protocol was followed:

- #12 (subgingival crown-root fracture, peg lateral): Root canal treatment, resin core build-up, and crown lengthening procedure with resin filling were performed before crown restoration.
- #21 (crown fracture with pulp exposure): Direct pulp capping and Class IV resin restoration were completed, followed by a crown restoration to address the patient's esthetic needs.
- #11 (lateral luxation, peg lateral): Root canal treatment and resin core build-up were followed by a porcelain laminate veneer.
- #22 (peg lateralis): Restored with a porcelain laminate veneer.

Restorative decisions were based on the extent of tooth structure loss, prioritizing minimally invasive preparation and adhesive bonding for optimal outcomes.

Results: All anterior teeth were successfully restored with bonded porcelain crowns or veneers, tailored to the extent of damage and morphology. The approach preserved maximum tooth structure while achieving excellent esthetic and functional outcomes. The patient reported high satisfaction with the results, and no complications were observed during a 6-month follow-up period.

Conclusion: Minimally invasive, indirect bonded porcelain restorations provide an effective and conservative solution for the rehabilitation of traumatized anterior teeth and peg lateralis. Careful case selection and restoration planning are essential for optimal esthetic and functional outcomes in complex anterior cases.

Funding/Conflict of Interest: None

Abstract ID: 126

Delayed Repositioning and Adhesive Restoration of a Luxated Tooth

**Seung-Woo Chae[a] | Hyun-Jung Kim[a] | Duck-Su Kim[a] | Kyoung-Kyu Choi[a] | [a]Kyung Hee University, Seoul, Korea*

Category: Clinical Report

Competition: Clinician Award

Keywords: Lateral luxation, LuxaCore Z, RelyX Unicem, delayed repositioning, resin-wire splint

Objective: To report the adhesive treatment strategy and clinical outcome of a maxillary central incisor with lateral luxation, managed 48 hours after trauma using resin-bonded splinting and adhesive restorative protocols.

Methods: A 33-year-old female patient presented with lateral luxation of tooth #11, 48 hours after trauma. Clinical examination revealed percussion sensitivity, gingival swelling and a loss of pulp vitality. Under local anesthesia, the tooth was manually repositioned and stabilized using a resin-wire splint. After root canal treatment, adhesive core build-up was performed using LuxaCore Z (DMG), a dual-cure composite material. A zirconia crown was fabricated and bonded with RelyX Unicem (3M), a self-adhesive resin cement. The patient was followed for 12 months with periodic radiographic and clinical evaluations to monitor periapical healing and restoration integrity.

Results: The repositioned tooth remained asymptomatic and functional throughout the 12-month follow-up. Radiographs showed no evidence of root resorption, ankylosis, or marginal bone loss. The resin-wire splint provided initial stabilization, and the adhesive restorations exhibited reliable marginal adaptation, with no signs of debonding or discoloration during the follow-up.

Conclusion: Delayed repositioning of lateral luxation teeth can be successfully managed using adhesive techniques. The use of resin-bonded splints, dual-cure core build-up materials, and self-adhesive resin cements contribute to functional and esthetic outcomes. This case highlights the importance of interdisciplinary management combining endodontic, restorative, and adhesive protocols in the management of dental trauma.

Funding/Conflict of Interest: None

Abstract ID: 127

Fiber Supported Composite Restorations: A Clinical Report

**Brendan Lopez | Seattle, WA*

Category: Clinical Report

Keywords: adhesive dental restorations, biomimetic, fiber supported

Large occlusal caries in relatively intact posterior teeth present a treatment dilemma for dentists. Caries beginning on the occlusal surface of teeth can significantly affect the dentin yet leave behind a vessel of intact tooth structure. A traditional approach obliterates the vessel through complete caries removal, endodontic treatment, placement of a post & core with subsequent preparation and placement of a fixed dental prosthesis. Application of the biomimetic approach through the use of adhesive dental restorations enables the vessel to carry on. A systematic approach to deep caries removal has been presented to maintain pulp vitality. A fiber supported direct composite restorative technique has been presented as an alternative approach to restoring structurally compromised teeth. The use of internal fiber reinforcement has also been shown to restore fracture resistance, reduce the gap formation on the cavity floor and improve bond strength to caries affected dentin. This report outlines the application of these principles and techniques in a 27 yo patient.

Funding/Conflict of Interest: None

Abstract ID: 128

Long-term Bond Strength of Purely Self-cured Experimental Adhesive

**Barbara Rietzler-Lins[a] | Rahel Nold[a] | Thorsten Bock[a] | [a]Ivoclar Vivadent, Schaan, Liechtenstein*

Category: Laboratory Research

Keywords: indirect restorations, universal adhesive

Objectives: Shear bond strength (SBS) tests are frequently employed to predict the clinical efficacy of dental adhesives. Initial bond strength is not a reliable indicator of long-term durability. This study examines the effects of 24-hour storage, 2-month storage, and thermocycling on SBS between an experimental dual-curing adhesive and a dual-curing luting composite without light curing.

Methods: SBS to bovine incisors was tested following ISO/TS-29022:2013 standards (N=5), using an experimental dual-curing universal adhesive, a dual-curing luting composite (Variolink Esthetic DC), and plugs made from a light-curing composite (Tetric EvoCeram). The adhesive was applied to the tooth by 20 seconds agitation in self-etch mode using a coated applicator. The composite plug was placed with a small amount of luting composite. The sample was allowed to cure in the dark for 15 minutes at room temperature. Specimens were aged in water (24 hours or 2 months at 37°C) or by thermocycling (5°C/55°C, 30 seconds dwell time, 10,000 cycles). SBS was determined using a ZWICK-ROELL Z010 Universal Testing Machine (500N load cell, 1.0 mm/min).

Results: The specimens were prepared purely in self-cure mode; neither the adhesive nor the luting material was light-cured. The applicator brush was coated with a co-initiator enabling adhesive curing upon contact with the dual-curing luting composite. Table 1 shows the long-term test results. Initial values show no significant difference in adhesion to dentin or enamel. On dentin, SBS was unaffected by aging with all fractures being cohesive. On enamel, SBS decreased after 2 months of storage and thermocycling but remained at a high level, ensuring reliable clinical performance.

Conclusions: An experimental dual-curing universal adhesive combined with a dual-curing luting composite demonstrated stable SBS on dentin up to 2 months of water storage and thermocycling. SBS values on enamel decreased but remained high. Therefore, the adhesive offers high long-term stability for indirect restorations without light curing.

Funding/Conflict of Interest: The authors are employees of Ivoclar Vivadent

Abstract ID: 130

Dentin Bonding Stability, Enzymatic, and Antibiofilm Activities of Flavonoid-Containing Adhesives

*by Beatriz Ometto Sahadi[a] | Carolina Bosso André[b] | Marina Rodrigues Santi[a] | Maicon Sebold[a] | Tainah Oliveira Rifane[a] | Marina Damasceno e Souza de Carvalho Chiari[c] | Fábio Nascimento Dupart[c] | Vicente Castelo Branco Leitune[d] | *Marcelo Giannini[a] | [a]State University of Campinas, Piracicaba, Brazil | [b]Federal University of Minas Gerais, Belo Horizonte, Brazil | [c]Federal University of São Paulo, São Paulo, Brazil | Federal University of São Paulo, São Paulo, Brazil |[d]Federal University of Rio Grande do Sul, Porto Alegre, Brazil*

Category: Laboratory Research

Keywords: Adhesive, bonding, dentin, flavonoids

Objectives: The aim of this study was to evaluate the effects of flavonoid-containing primers and adhesives (FCPA) on dentin microtensile bond strength (μTBS), inhibition of metalloproteinases (MMPs), biofilm formation and degree of conversion.

Methods: Three flavonoids were tested: Baicalein, Kaempferol and Naringin, which formed 6 experimental groups as they were incorporated (20 mM) into a commercial adhesive (Clearfil Universal Bond Quick, Kuraray) or into a 50% ethanol solution and used as a primer. Three Controls were also tested: Negative (commercial adhesive), Positive (0,2% chlorhexidine primer) and 50% ethanol primer. Experimental groups and Controls were applied to dentin and evaluated according to the μTBS test (n=10), dentin-adhesive interfacial morphology (DAM) (n=3) and *in situ* zymography (n=3). *Streptococcus mutans* biofilm was growth on adhesive surfaces to determine the bacterial cell viability (BCV) and the FTIR was used to calculate the degree of conversion (DEC) of adhesives containing flavonoids. μTBS data were analyzed by generalized linear models, while BCV and DEC data were analyzed by a one-way ANOVA, followed by Bonferroni and Tukey test (α=0.05).

Results: FCPA showed higher dentin μTBS than that obtained for the Negative Control at one year. However, only the adhesives containing flavonoids showed higher μTBS values than the Positive Control. FCPA did not affect the DAM, BCV and DEC. In general, FCPA decreased MMPs activity, but the complete inhibition was found only with Baicalein primer.

Conclusions: Results suggested that FCPA can be used in order to improve the dentin adhesive bonding.

Funding: CNPq (308654/2023-4) and FAPESP (2021/11972-0 and 2019/04737-4), Brazil

Abstract ID: 131

Evaluation of Deep Class II Composite Placement Techniques Using OCT and Microtensile Bond Strength Testing

**Megha Rao[a] | Alireza Sadr[a] | Alan M Atlas[b] | Andre V Ritter[a] | [a]University of Washington, Seattle, USA | [b]Penn Dental Medicine, Philadelphia, USA*

Category: Laboratory Research

Competition: Student Scientist Award

Keywords: Composite resin, bonding, dental restoration failure, optical coherence tomography

Objective: This study evaluated post-polymerization defects and bond strength in deep Class II MOD restorations using Optical Coherence Tomography (OCT) and Microtensile Bond Strength (MTBS) testing across different composite placement techniques.

Methods: MOD cavities (5 mm deep) were prepared in extracted human molars in 4 groups: **BULK**: Selective enamel etching and Prime&Bond Active, single increment of TPH Spectra (Dentsply Sirona); **LAYER**: Selective enamel etching and Prime&Bond Active, 2-mm increments of SDR flow+ (Dentsply Sirona) followed by a final TPH Spectra layer; **CIRCULAR**: Selective enamel etching and Prime&Bond Active, 2-mm SDR flow+ base, circular increments of TPH Spectra for walls, and a final occlusal increment; **INJECTION**: Total etch and ScotchBond Universal heated Filtek Bulk Fill Flowable and Filtek One Bulk Fill Restorative (3M) using the injection molding technique. Each specimen was scanned using Dental OCT (Yoshida) and analyzed for defects, then sectioned for MTBS testing of the central beams. OCT data was analyzed using Kruskal–Wallis and MTBS data were analyzed using ANOVA followed by pairwise analyses (alpha=0.05).

Results: OCT (Figure) revealed significant differences in dentin gaps, marginal deficiencies, and stress cracks ($p<0.005$). BULK showed the most defects, which was significantly different from other groups. INJECTION showed significant presence of flowable composite on marginal ridge ($P<0.001$) and occlusal surfaces ($p<0.05$). MTBS ranged from 0 MPa (frequent pretest failures in BULK) to 85 MPa in CIRCULAR, which showed significantly higher bond strength than other groups ($p<0.001$). No significant difference was observed between LAYER and INJECTION ($p>0.05$).

Conclusion: The bulk technique resulted in the highest failure rates, including stress cracks and poor bonding. The circular layering method known as ASCRPT, improved bonding to deep dentin and marginal adaptation. The heated injection molding approach did not improve bond strength while presence of the weaker flowable composite was detected on occluding surfaces.

Funding: Study partly funded by Dentsply Sirona.

Abstract ID: 132

Optimizing Ultra-high Molecular Weight Polyethylene Bonding: Comparative Evaluation of Surface Treatment Effects

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Category: Laboratory Research

Competition: Student Scientist Award

Keywords: Bond strength, Bonding, fiber-reinforced composite

Introduction: Ultra-high molecular weight polyethylene (UHMWPE) fibers are used in restorative dentistry to reinforce direct restorations, bridge structural cracks, and reduce polymerization shrinkage stress. However, the optimal bonding protocol for integrating UHMWPE into composite materials remains unclear. This study aimed to identify the most effective pretreatment strategy for UHMWPE fibers in direct composite restorations using the pull-out bond strength test (POBS).

Methods: POBS of plasma-treated leano-weaved UHMWPE fiber (Ribbond Ultra 3mm, Seattle, WA) bonded onto standardized base composite patties was measured across 12 pretreatment groups: G1: unfilled resin (Ribbond Wetting Resin); G2: adhesive resin (Clearfil SE Bond2 bonding); G3: silane (Clearfil Ceramic Primer) followed by G2; G4: universal adhesive (Clearfil Universal Bond Quick2); G5: universal adhesive (Scotchbond Universal); G6: filled adhesive (Optibond FL); G7: flowable composite (Majesty Flow); G8: flowable composite with G2; G9: flowable composite with G3; G10: flowable composite with silane only; G11: hybrid composite (GrandioSO) with G2; G12: hybrid with G3. Failure modes and specimen integrity were assessed using optical coherence tomography (Yoshida Dental OCTINA).

Results: Mean POBS values ranged from 29 to 113 MPa. One-way ANOVA revealed significant differences among groups ($F=175$, $p=.000$). The lowest POBS was observed when no adhesive was applied (G7, G10, $p<.001$), while the highest values were achieved in groups treated with adhesive in combination with composite (G8, G9, G11, and G12). The addition of a separate silane agent to the adhesive significantly improved POBS, with the highest value observed in G12 ($p<.05$). The filled adhesive (G6) demonstrated higher bond strength than other adhesives (G1, G2, G4, and G5, $p<.05$). Pretest internal defects were observed in G7 and G10. Failure modes indicating cohesive failure of the base patty substrate were noted in G9, G11, and G12.

Conclusion: UHMWPE fiber bonding was most effective when adhesive was combined with highly filled composite (Chyz technique), enabling precise fiber placement. Silanization provided a modest but consistent enhancement in POBS, which may improve long-term performance.

Conflicts of Interest: None

Abstract ID: 133

Enhanced Bonding to Caries-Affected Dentin Using an Isocyanate-Based Primer

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Category: Laboratory Research

Competition: Student Scientist Award

Keywords: collagen, cross-linking reagents, dental adhesives, dental diseases, dental restoration, matrix metalloproteinases

Objectives: Dental caries is the most common oral disease and the most common cause of resin restorations. In minimally invasive dentistry, the principle behind cavity preparation is to remove external caries-infected dentin (CID) and preserve internal caries-affected dentin (CAD) and sound dentin (SD). The cavity floor is mainly composed of CAD, but the poor bonding performance of CAD has become a widespread concern. This study evaluated the performance of a new collagen-reactive monomer (ITCM) used as a primer to improve the bonding performance of CAD.

Methods: The experimental specimens were grouped as follows: SD, CAD, and ITCM pretreated CAD (CAD-ITCM). Dentin slices were obtained for attenuated total reflectance–Fourier transform infrared (ATR-FTIR) analysis. The bonded samples were subjected to microtensile bond strength analysis after 24 h of water storage or aging by thermocycling, and the bonding interface quality was evaluated by nanoleakage assessment, interfacial nanoindentation testing, and in situ zymography. Cytotoxicity experiments with ITCM were performed.

Results: ATR-FTIR showed that the isocyanate groups in ITCM can covalently bind and form hydrogen bonds with the collagen in CAD to mediate chemical bonding. ITCM pretreatment significantly improved the bond strength of CAD ($P < 0.05$), reduced interfacial nanoleakage, improved the sealing of the bonding interface, enhanced the homogeneity of the hybrid layer, and inhibited matrix metalloproteinase activity. In addition, ITCM presented acceptable biocompatibility for dental restorative application.

Conclusion: Taken together, this study reported the application of ITCM to induce collagen based chemical bonding in the CAD bonding system, which fills the gap in strategies to improve the bonding performance of CAD immediately and after aging and has important clinical application prospects.

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Conflict of Interest: None

Abstract ID: 134

Porcelain Palatal Veneer Restoration for Reinforcement of Immature Anterior Teeth After Trauma

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Category: Clinical Report

Keywords: Porcelain palatal veneer, deep bite, trauma

Objectives: To present a multidisciplinary approach for managing traumatized, immature permanent maxillary central incisors (#11, 21) with pulp exposure and crown fracture in a growing male patient. The approach utilizes pulp revascularization and porcelain palatal veneer restoration to address the challenges posed by a deep anterior bite.

Methods: A 9-year-old male patient presented with traumatic crown fractures and pulp exposure of immature maxillary central incisors (#11, 21). Following pulp revascularization to preserve tooth vitality, restorative planning addressed the high risk of fracture associated with the patient's deep anterior bite and fragile tooth structure. Minimally invasive porcelain palatal veneers were fabricated and adhesively bonded to the palatal surfaces of #11 and #21, aiming to provide durable reinforcement and functional protection while maintaining esthetics.

Results: The porcelain palatal veneers demonstrated excellent adaptation and retention, effectively reinforcing the structurally compromised teeth against occlusal forces associated with deep bite. At follow-up, the restorations remained intact with no signs of fracture or debonding. The teeth were asymptomatic, and both esthetic and functional outcomes were highly satisfactory.

Conclusion: Porcelain palatal veneers offer a conservative and reliable restorative option for immature anterior teeth at high risk of fracture, particularly in patients with deep bite. This approach provides superior reinforcement and long-term protection compared to conventional resin restorations, while preserving tooth structure and esthetics.

Funding/Conflict of Interest: None

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Effect of Temperature on Heat Generation during Composite Photopolymerization

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Category: Laboratory Research

Keywords: Composite, differential scanning calorimetry, heat, polymerization, temperature

Objectives: This study aimed to investigate the effect of temperature on heat generation during composite photopolymerization.

Methods: Four types of A2-shade composites were used: a packable composite (Z250 Universal Restorative [Z2]), a packable bulk-fill composite (One Bulk Fill Restorative [OB]), a flowable composite (Supreme Flowable Restorative [SF]), and a bulk-fill flowable composite (Fill and Core Flowable Restorative [FC]). Each composite (0.035 g) was photopolymerized using an LED light with a radiant emittance of 2,100 mW/cm^2 for 20 seconds. Two additional light exposures, following the same protocol as the first, were performed on the photopolymerized specimens. Heat flow of the composites was measured over 300 seconds using a photo differential scanning calorimeter under two isothermal conditions (25℃ and 40℃) (n=3). The maximum heat flow ($HF_{composite}$) caused by polymerization heat of the composite was determined from the net heat flow vs. time curve, obtained by subtracting the average heat flow curve of the additional light exposures from the first light exposure curve. Peak time (PT) was defined as the time at which $HF_{composite}$ occurred.

Results: $HF_{composite}$ (mW) under 40℃ isothermal condition (66.30–157.76) was higher than under 25℃ isothermal condition (51.97–133.09) for all composite types ($p<0.05$). Flowable composites exhibited greater $HF_{composite}$ than packable composites, with SF showing the highest $HF_{composite}$ among all the tested composites ($p<0.05$). PT (s) at 40℃ (2.77–3.61) was shorter than at 25℃ (2.87–4.24), with statistically significant differences observed in OB and SF only ($p<0.05$). OB showed the longest PT under both thermal conditions ($p<0.05$).

Conclusion: The kinetics of heat generation during composite photopolymerization varied depending on the composite type. Heat flow caused by polymerization heat of the composites increased, and peak time was shortened at higher temperature compared to lower temperature, regardless of composite type.

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Adhesive Reconstruction of Structurally Compromised Dentition

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Category: Clinical Report

Competition: Clinician Award

Keywords: Deep marginal elevation, fiber-reinforced composite, polyethylene fiber Ribbond

Objectives: For structurally compromised teeth with no ferrule or missing teeth spaces, could there be an intermediate and viable restorative treatment alternative to Extrusion, Clinical Crown lengthening with Indirect Prosthesis or Orthodontics and Surgical Implants to preserve the remaining tooth structure in the asymptomatic isolated zone of fracture and meet patient's esthetic needs without invasively changing the biology of the area? Is it supported by evidenced based dentistry? Deep marginal elevation procedure. Fiber incorporation in the restorative segment.

Methods: Composite restorative system. Gingivectomy with Diode laser (AMD Lasers Picasso). Air-abrasion with aluminum oxide at resin-dentin interface. Deep marginal elevation, Garrison and tofflemire retainer system. Clearfil SE Bond2 with Majesty Flow for deep marginal elevation. Clear mylar strips and palodent matrices for interproximal contacts. Palatal shell with APX using a prefabricated putty matrix. Tokuyama Fiber Post with SE2 and SA Universal Cement. Ribbond ultra-high molecular weight fibers. EverX Flow 2 mm thick around fiber post. Finished F w/ mix of Majesty Universal, Filtek Supreme XWB shade. 8862 diamond bur for finishing. White Point, Soflex and Buffs for final polish.

Results:

1. Single fixed restoration:-Versus removable/invasive options
2. Meets patient's immediate esthetic needs.
3. Maintains integrity of periodontium by:

-Mechanical loading of periodontium under occlusal load.

-Preservation of remaining structures in the vicinity of dental fracture or missing tooth space.

4. Deep marginal elevation:

-Preserves papilla.

-Prevents black triangle formation & soft tissue reconstruction.

-Control emergence profile by choice of bands.

5. Fibers in restorative segment:

-Act as physical barrier, resist crack formation & propagation.

-Redistribute energy, prevent debonding at resin-dentin interface.

-Reduce polymerization shrinkage by reduction in total resin volume.

6. Fail-safe design:

-Fractures occur in safe mode, at resin-dentin interface instead of catastrophic tooth fractures.

1. Patient education regarding treatment and its alternatives: essential to success and longevity.
2. Provides psychosocial support to the patient.
3. Convenient to the patient.
4. Minimally invasive approach for complex cases with financial or anatomical limitations.
5. Cleansable restorative-tooth interface.
6. Accessible margin for repairs.
7. Success ingredients: Bonding, air abrasion, primer, fiber and balanced occlusion.

Funding/ Conflict of interest: University of Washington/None

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Biaxial Flexural Strength of Novel CAD/CAM Resin-Based Definitive Materials

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Category: Laboratory Research

Keywords: CAD/CAM, biaxial flexural strength, printed resins

Objective: Evaluate biaxial flexural strength (BFS) of two additively manufactured resin ceramic materials (VarseoSmile Crown Plus-VCP/ Ceramic Crown-CC) and compare with subtractively manufactured (VITA ENAMIC-VE/Lava Ultimate-LU) and one manually layered resin composite material (Filtek Supreme Ultra-FSU).

Methods: For all five materials, a total of 210 discs (diameter 12.00 mm/thickness 2.00 mm), divided into 14 groups with n=15, were fabricated. For VCP and CC, two different printing thicknesses (50 µm and 100 µm) were used. Half of the groups were aged using thermocycling. All specimens were subjected to BFS. Data were analyzed using parametric tests: two-way and one-way ANOVA with Bonferroni post-hoc test (α=0.05).

Results: BFS values ranged from 230.07 ±17.15 MPa (non-aged CC 50 µm) to 107.22 ±26.52 MPa (aged VCP 100 µm). Milled and layered materials did not differ significantly from each other, while CC was significantly higher and VCP was significantly lower than most other materials. Aging significantly reduced BFS for most groups. Layer thickness of 50 µm was significantly higher than 100 µm for Ceramic Crown, but not for VarseoSmile Crown Plus.

Conclusion: The novel printed resin-ceramic materials exhibit varying BFS performances when compared with each other and with milled and layered materials. Depending on the material, lower printing thickness may improve performance, while all materials deteriorate in strength over time.

Funding/Conflict of Interest: None

Abstract ID: 138

Sulfinate Salt Reverses Bond Strength to Bleached Enamel

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Category: Laboratory Research

Keywords: Bleached enamel, bond strength, sulfinate salt, universal adhesive

Objectives: To evaluate the effects of sulfinate salt (sulfinating agent; SA) on the bond strength of universal adhesives to bleached enamel. Additionally, the surface characteristics of bleached enamel were analyzed using Fourier-transform infrared (FTIR) spectroscopy and scanning electron microscopy (SEM).

Methods: SA (Clearfil DC Activator) was applied to bleached bovine enamel specimens prior to the application of universal adhesives—Clearfil Universal Bond Quick (UBQ), Optibond Universal (OBU), and Palfique Universal Bond (PUB)—using the etch-and-rinse mode. Bleached enamel specimens without SA application and unbleached enamel specimens served as controls. Shear bond strength (SBS) was measured after 24 hours of water storage. The surface characteristics of bleached enamel were analyzed using FTIR spectroscopy and SEM. Data were statistically analyzed with a three-way ANOVA followed by Tukey post hoc tests (α=0.05).

Results: SBS was significantly affected by the type of adhesive, bleaching, and application of SA (p<0.001). Among the tested adhesives, the self-cure PUB demonstrated lower bond strength to unbleached enamel; however, its SBS was significantly increased by the application of SA (p=0.024). Bleaching significantly reduced SBS across all adhesive groups (p<0.001), with the least reduction observed in the group bonded with UBQ. The application of SA notably increased SBS in bleached enamel when bonded with OBU (p=0.008) and PUB (p<0.001) but had no significant effect on UBQ (p=0.96). FTIR and SEM analyses revealed significant alterations to the enamel surface following bleaching.

Conclusion: Bleaching significantly reduced the bond strength to enamel, which is attributed to residual molecules and surface alteration. However, the application of SA could improve bond strength, with the extent of improvement depending on the type of adhesive used.

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