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Post-and-Core Restoration of Severely Damaged Permanent Posterior Teeth in Young Adolescents. 
PURPOSE: This retrospective study evaluated the survival rates of postendodontic severely decayed posterior permanent teeth in young adolescents. 
MATERIALS AND METHODS: A total of 48 teeth (patient age range: 8.8-16.9 years) restored with a Kurser post- and core-system (Anchor System, Kurser K4) were assessed. Follow-up appointments 1 to 6 years posttreatment included radiographs and a clinical examination. 
RESULTS: A total of 5 teeth (10.4%) were extracted, and 13 restorations (27%) required repair. Average restoration-to-failure time was 27 months (SD 12.2 months). 
CONCLUSION: In view of these findings, clinicians should consider post-and-core restorations an alternative to extractions of endodontically treated severely damaged teeth in adolescents.

2. McHugh LEJ, Politi I, Al-Fodeh RS, Fleming GJP. 
Implications of resin-based composite (RBC) restoration on cuspal deflection and microleakage score in molar teeth: Placement protocol and restorative material. 
*Dental Materials* 2017 Sep; 33(9):e329-e335. 
OBJECTIVE: To assess the cuspal deflection of standardised large mesio-occluso-distal (MOD) cavities in third molar teeth restored using conventional resin-based composite (RBC) or their bulk fill restorative counterparts compared with the unbound condition using a twin channel deflection measuring gauge. Following thermocycling, the cervical microleakage of the restored teeth was assessed to determine marginal integrity. 
METHODS: Standardised MOD cavities were prepared in forty-eight sound third molar teeth and randomly allocated to six groups. Restorations were placed in conjunction with (and without) a universal bonding system and resin restorative materials were irradiated with a light-emitting-diode light-curing-unit. The dependent variable was the restoration protocol, eight oblique increments for conventional RBCs or two horizontal increments for the bulk fill resin restoratives. The cumulative buccal and palatal cuspal deflections from a twin channel deflection measuring gauge were summed, the restored teeth thermally fatigued, immersed in 0.2% basic fuchsin dye for 24h, sectioned and examined for cervical microleakage score. 
RESULTS: The one-way analysis of variance (ANOVA) identified third molar teeth restored using conventional RBC materials had significantly higher mean total cuspal deflection values compared with bulk fill resin restorative restoration (all p<0.0001). For the conventional RBCs, Admira Fusion (bonded) third molar teeth had significantly the lowest microleakage scores (all p<0.001) while the Admira Fusion x-tra (bonded) bulk fill resin restored teeth had significantly the lowest microleakage scores compared with Tetric EvoCeram Bulk Fill (bonded and non-bonded) teeth (all p<0.001). 
SIGNIFICANCE: Not all conventional RBCs or bulk fill resin restoratives behave in a similar manner when used to restore standardised MOD cavities in third molar teeth. It would appear that light irradiation of individual conventional RBCs or bulk fill resin restoratives may be problematic such that material selection is vital in the absence of clinical data.

Longevity of Anterior Composite Restorations in a General Dental Practice-Based Network.
This practice-based study investigated the performance of a large set of anterior composite restorations placed by a group of 24 general practices. Based on data from electronic patient files, the longevity of 72,196 composite restorations was analyzed, as placed in 29,855 patients by 47 general dental practitioners between 1996 and 2011. Annual failure rates (AFRs) were calculated, and variables associated with failure were assessed by multivariate Cox regression analysis with shared frailty for 2 age groups (5 to 24 y and >=25 y). The observation time of restorations varied from 2 wk to 13 y, with a mean of 4.8 y, resulting in a mean AFR of 4.6% (95% confidence interval [95% CI], 4.5% to 4.6%) at 5 y. Among dentists, a relevant variation in clinical performance of restorations was observed, with an AFR between 2% and 11%. The risk for restoration failure increased in individuals up to 12 y old, having a 17% higher risk for failure when compared with the age group of 18 to 25 y (hazard ratio, 1.17; 95% CI, 1.03 to 1.34), and for the age group >65 y, having a 81% higher risk for failure when compared with 25 to 35 y (hazard ratio, 1.81; 95% CI, 1.66 to 1.98). In both multivariate models, there was a difference in longevity of restorations for different teeth in the arch, with fillings in central incisors being the most prone to failure and replacement. It was concluded that anterior composite restorations placed by general dental practitioners showed an adequate clinical performance, with a relevant difference in outcome among operators.

Restorative composites have evolved significantly since they were first introduced in the early 1960s, with most of the development concentrating on the filler technology. This has led to improved mechanical properties, notably wear resistance, and has expanded the use of composites to larger posterior restorations. On the organic matrix side, concerns over the polymerization stress and the potential damage to the bonded interface have dominated research in the past 20 y, with many "low-shrinkage" composites being launched commercially. The lack of clinical correlation between the use of these materials and improved restoration outcomes has shifted the focus more recently to improving materials' resistance to degradation in the oral environment, caused by aqueous solvents and salivary enzymes, as well as biofilm development. Antimicrobial and ester-free monomers have been developed in the recent past, and evidence is mounting for their potential benefit. This article reviews literature on the newest materials currently on the market and provides an outlook for the future developments needed to improve restoration longevity past the average 10 y.

The aim of this study was to identify mechanical complications associated with Nobel Biocare’s angled screw channel (ASC) restorations following provision of the definitive crown. All ASC restorations provided between 1 January 2014 and 19 January 2016 were identified. Patients’ clinical records were reviewed for demographic details, implant characteristics, occlusal considerations, and complications. A total of 84 implants placed in 60 patients were included. Three patients (4%) returned with mechanical complications, but the majority (n = 81; 96%) had no recorded complications. Long-term follow up is needed, but ASC restorations appear to offer a reliable and retrievable alternative to cement-retained restorations.
To examine the bonding state of metal-free CAD/CAM onlay restorations made from two popular resin composite blocks and a typical glass-ceramic block after cyclic loading, with and without immediate dentin sealing (IDS). Standardized mesial-distal-occlusal-buccal (MODB) cavities in 24 extracted human molars were prepared. The intra-cavity dentin surfaces of half of the cavities were immediately sealed with all-in-one adhesive and flowable composite, while those of the other half were not. All cavities were scanned, from which CAD/CAM onlays were fabricated from three types of block and cemented with an adhesive resin cement system. The restored specimens were subjected to cyclic loading and the intra-cavity microtensile bond strength was measured. IDS improves not only the internal bond strength, but also the bond reliability of metal-free CAD/CAM onlay restorations. The resin composite block seems to be more effective than a typical glass-ceramic block for achieving both high bond strength and excellent bond reliability.

This is the second paper in a two-part series discussing the management of common restorative dental emergencies. The first paper focussed upon problems relating to conventional fixed and removable restorations, and this paper discusses the management of common dental implant related emergencies. With dental implant treatment becoming an increasingly popular method of replacing missing teeth, it is very likely that dentists working in general practice will routinely come across patients who have previously undergone this form of treatment, even if they themselves are not directly involved in placing or restoring dental implants. This paper is aimed at general dental practitioners (GDPs) who have some experience in managing dental implants, and those who want to gain further insight into how such situations may be managed.

Dental emergencies affect a large proportion of the population. While there is ample information in the literature on how to manage medical emergencies in dental practice, there is little information on common dental emergencies and how to manage them. In the UK, the 2009 Adult Dental Health Survey reported 9% of dentate adults reporting pain at their clinical examination. The prevalence of non-pain related restorative dental emergencies is estimated to be higher, and will be a common presenting situation in the dental clinic. Often these unplanned events cause difficulties for dental practitioners, who are already constrained by time, to fit in these patients and manage them. Over and above this, the increasing life spans, retention of teeth into later life and finite life of dental restorations all add to the challenges encountered by the dental practitioner. Prompt and effective management of these conditions often leads to optimising patient experience, but also offers better outcomes. This two-part series provides an overview of the more common dental emergencies encountered by the dental practitioner and their management. Paper 1 focuses on the management of common tooth-related emergencies and includes non-odontogenic and odontogenic pain. Paper 2 focuses on the management of osseointegrated dental implant related emergencies.
9. Innes NPT, Schwendicke F.
Restorative Thresholds for Carious Lesions: Systematic Review and Meta-analysis.
Journal of Dental Research 2017 May;96(5):501-508.
Current evidence supports noninvasive/nonrestorative treatment of "early" carious lesions: those confined to enamel or reaching the enamel-dentin junction. The extent that dentists' thresholds for intervening restoratively have changed with this evidence is unknown. This systematic review aimed to determine dentists' and therapists' current lesion threshold for carrying out restorative interventions in adults/children and primary/permanent teeth. Embase, Medline via PubMed, and Web of Science were searched for observational studies, without language, time, or quality restrictions. Screening and data extraction were independent and in duplicate. Random-effects meta-analyses with subgroup and meta-regression analysis were performed. Thirty studies, mainly involving dentists, met the inclusion criteria. There was heterogeneity in sampling frames, methods, and scales used to investigate thresholds. The studies spanned 30 y (1983-2014), and sample representativeness and response bias issues were likely to have affected the results. Studies measured what dentists said they would do rather than actually did. Studies represented 17 countries, focusing mainly on adults (n = 17) and permanent teeth (n = 24). For proximal carious lesions confined to enamel (not reaching the enamel-dentin junction), 21% (95% confidence interval [CI], 15%-28%) of dentists/therapists would intervene invasively. The likelihood of a restorative intervention almost doubled (risk ratio, 1.98; 95% CI, 1.68-2.33) in high caries risk patients. For proximal lesions extending up to the enamel-dentin junction, 48% (95% CI, 40%-56%) of dentists/therapists would intervene restoratively. For occlusal lesions with enamel discoloration/cavitation but no clinical/radiographic dentin involvement, 12% (95% CI, 6%-22%) of dentists/therapists stated they would intervene, increasing to 74% (95% CI, 56%-86%) with dentin involvement. There was variance between countries but no significant temporal trend. A significant proportion of dentists/therapists said they would intervene invasively (restoratively) on carious lesions where evidence and clinical recommendations indicate less invasive therapies should be used. There is great need to understand decisions to intervene restoratively and to find implementation interventions that translate research evidence into clinical practice.

10. Martinez Choy SE, Lenz J, Schweizerhof K, Schmitter M, Schindler HJ.
Realistic kinetic loading of the jaw system during single chewing cycles: a finite element study.
Although knowledge of short-range kinetic interactions between antagonistic teeth during mastication is of essential importance for ensuring interference-free fixed dental reconstructions, little information is available. In this study, the forces on and displacements of the teeth during kinetic molar biting simulating the power stroke of a chewing cycle were investigated by use of a finite-element model that included all the essential components of the human masticatory system, including an elastic food bolus. We hypothesised that the model can approximate the loading characteristics of the dentition found in previous experimental studies. The simulation was a transient analysis, that is, it considered the dynamic behaviour of the jaw. In particular, the reaction forces on the teeth and joints arose from contact, rather than nodal forces or constraints. To compute displacements of the teeth, the periodontal ligament (PDL) was modelled by use of an Ogden material model calibrated on the basis of results obtained in previous experiments. During the initial holding phase of the power stroke, bite forces were aligned with the roots of the molars until substantial deformation of the bolus occurred. The forces tilted the molars in the buccolingual and mesio-distal directions, but as the intrusive force increased the teeth returned to their initial configuration. The Ogden material model used for the PDL enabled accurate prediction of the displacements observed in experimental tests. In conclusion, the comprehensive kinetic finite element model
reproduced the kinematic and loading characteristics of previous experimental investigations.

11. Osman RB, Alharbi N, Wismeijer D.
PURPOSE: The aim of this study was to evaluate the effect of the build orientation/build angle on the dimensional accuracy of full-coverage dental restorations manufactured using digital light-processing technology (DLP-AM).
MATERIALS AND METHODS: A full dental crown was digitally designed and 3D-printed using DLP-AM. Nine build angles were used: 90, 120, 135, 150, 180, 210, 225, 240, and 270 degrees. The specimens were digitally scanned using a high-resolution optical surface scanner (iScan D104i, Imetric). Dimensional accuracy was evaluated using the digital subtraction technique. The 3D digital files of the scanned printed crowns (test model) were exported in standard tessellation language (STL) format and superimposed on the STL file of the designed crown [reference model] using Geomagic Studio 2014 (3D Systems). The root mean square estimate (RMSE) values were evaluated, and the deviation patterns on the color maps were further assessed.
RESULTS: The build angle influenced the dimensional accuracy of 3D-printed restorations. The lowest RMSE was recorded for the 135-degree and 210-degree build angles. However, the overall deviation pattern on the color map was more favorable with the 135-degree build angle in contrast with the 210-degree build angle where the deviation was observed around the critical marginal area.
CONCLUSIONS: Within the limitations of this study, the recommended build angle using the current DLP system was 135 degrees. Among the selected build angles, it offers the highest dimensional accuracy and the most favorable deviation pattern. It also offers a self-supporting crown geometry throughout the building process.

The purpose of the present study was to evaluate and compare the fracture strength and failure modes of endocrowns, zirconia post, and fiber post supported restorations and predict the clinical outcomes of six different prostheses used for endodontically treated teeth. Sixty (n=10) maxillary central incisors were restored with zirconia post/resin-nano-ceramic crown (ZrRNC), fiber post/resin-nano-ceramic crown (FbRNC), zirconia post/lithium disilicate ceramic crown (ZrLDS), fiber post/lithium disilicate ceramic crown (FbLDS), resin-nano-ceramic endocrown (EndoRNC), and lithium disilicate ceramic endocrown (EndoLDS). Fracture strength test was performed. Fracture loads and modes were determined. The EndoLDS group had the highest fracture strength, followed by ZrRNC and EndoRNC group. However the results were not significantly different among groups (p>0.05). The failure modes of the restorations changed according to the restorative materials. Endodontically treated anterior teeth might be restored with endocrowns as well as other post-core restorations, however tooth fracture failures should be considered that affect reliability of endocrowns.

13. Raab P, Alamanos C, Hahnel S, Papavasileiou D, Behr M, Rosentritt M.
Dental materials and their performance for the management of screw access channels in implant-supported restorations.
Unsuccessfully sealed screw access channels of prosthetic implant abutments may lead to malodor or peri-implant diseases in gingival tissues adjacent to implant-supported restorations. Therefore, 72 sets of screw channel analogs with six different materials incorporated (Polytetrafluoroethylene (PTFE), wax, gutta-percha, cavit, endofrost-pellets and cotton pellets) were exposed (2.5 h, 37\degree C) to Streptococcus mutans, oralis and Candida albicans suspensions. Bacterial adherence was quantified by using the fluorescence dye, Alamar Blue/resazurin, and an automated multifunctional reader. For quantification of fungal adherence the ATP-based bioluminescence approach was used. High relative fluorescence and luminescence intensities (>10,000), indicating high adhesion of streptococci and fungi were found for cotton and endofrost-pellets and low intensities (<5,000) for wax, gutta-percha, cavit and PTFE. The quantity of bacterial and fungal adhesion differed significantly between the assessed various sealing materials. In conclusion and within the limitations of this study, wax, gutta-percha, cavit and PTFE should be preferred as sealing materials.


The purpose of this study was to evaluate the effect of surface sealant application and 10,000 thermocycles on the surface roughness and microhardness of different resin composite systems. A micro-hybrid (G Aenial Posterior), a nano-hybrid (Clearfil Majesty Posterior), a nano-fill (Filtek Ultimate Universal Restorative, Enamel Shade), and a bulk-fill resin composite (Filtek Bulk Fill Posterior Restorative) were used for the study. Specimens were evaluated at 24 h, after application of the surface sealant Fortify Plus, and after thermocycling. Data were analyzed using two-way repeated measures of analysis of variance (ANOVA) and a posthoc Bonferroni test (p<0.05). Surface roughness values of G Aenial Posterior and Filtek Ultimate Universal Restorative increased significantly after surface sealant application. However, neither surface sealant application nor thermocycling had a significant effect on composite microhardness values except Filtek Ultimate Universal Restorative (p>0.05).


BACKGROUND: The aim of this study was to compare the flexural strength and Vickers hardness of tooth-coloured restorative materials with and without applying a self-adhesive coating for up to 6 months.

METHODS: Specimens were prepared from three resin composites (RC), two resin-modified glass-ionomer cements (RM-GIC) and two conventional glass-ionomer cements (CGIC). All materials were tested both with and without applying G-Coat Plus (GCP). Specimens were conditioned in 37 degreeC distilled deionized water for 24 h, and 1, 3 and 6 months. The specimens were strength tested using a four-point bend test jig in a universal testing machine. The broken specimen’s halves were used for Vickers hardness testing. Representative specimens were examined under an environmental scanning electron microscope.

RESULTS: Data analysis showed that regardless of time and materials, generally the surface coating was associated with a significant increase in the flexural strength of the materials. Applying the GCP decreased the hardness of almost all materials significantly (P < 0.05) and effect of time intervals on hardness was material dependent.
CONCLUSIONS: The load-bearing capacity of the restorative materials was affected by applying self-adhesive coating and ageing. The CGIC had significantly higher hardness but lower flexural strength than the RM-GIC and RC.

16. Malo P, de Araujo Nobre MA, Guedes CM, Almeida R. Outcomes of Immediate Function Implant Prosthetic Restorations with Mechanical Complications: A Retrospective Clinical Study with 5 Years of Follow-Up. European Journal of Prosthodontics & Restorative Dentistry 2017 Mar;25(1):26-34. Mechanical complications may have a significant impact on the outcome of implant-supported restorations; however, few studies address the topic. This study investigated the outcomes of implant supported restorations with mechanical complications. A total of 378 patients with 378 restorations supported by 1283 implants were included. Results demonstrated a prosthetic and implant cumulative survival rate at 5 years of 99.7% and 95.7%, respectively. Maxillary implants were a determinant for implant failure (hazard ratio= 6.7), while a reduced risk was registered for single tooth restorations (hazard ratio= 0.1) after adjusting for other variables of interest.

17. Cebe F, Aktan AM, Ozsevik AS, Ciftci ME, Surmelioglu HD. The effects of different restorative materials on the detection of approximal caries in cone-beam computed tomography scans with and without metal artifact reduction mode. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology 2017 Mar;123(3):392-400. OBJECTIVES: The aim of this study was to investigate the influence of artifacts produced by different restorative materials on the detection of approximal caries in cone-beam computed tomography (CBCT) scans with and without the application of an artifact-reduction (AR) option. STUDY DESIGN: Ninety-eight noncavitated premolar and molar teeth were placed with approximal contacts consisting of 2 sound or carious teeth and 1 mesial-occlusal-distal restored tooth with resin-modified glass-ionomer cement (RMGIC), amalgam, composite, ceramic-based composite (CBC), or computer-aided design-computer-aided manufacturing (CAD-CAM) zirconia materials in between. The teeth were scanned with a CBCT system with and without the AR option. Images were evaluated by 2 observers. The teeth were histologically evaluated, and sensitivity, specificity, and areas under the receiver operating characteristic (ROC) curve were calculated according to the appropriate threshold. RESULTS: Specificity and sensitivity values for contact surfaces ranged from 0-48.39 and 82.93-98.40, respectively. The AR option affected (P < .05) approximal caries detection of the amalgam, composite, CAD-CAM, and CBC groups in contact surfaces and composite and RMGIC groups in noncontact surfaces. CONCLUSION: Artifacts produced by different restorative materials could affect approximal caries detection in CBCT scans. Use of the AR option with CBCT scans increases the accuracy of approximal caries detection.

18. Arafioti A, Giannakoulas DG, Kournetas N, Grigoriou S, Kontakiotis EG. Different Patterns of Restoration Provision Between Initial Endodontic Treatment and Retreatment: A Retrospective Clinical Study. International Journal of Prosthodontics 2017 Jul/Aug;30(4):354-356. PURPOSE: The aim of this study was to investigate the relationship between type of endodontic treatment and choice of definitive restoration and to show the
prevalence of endodontic treatment options according to patient age and type of tooth.

MATERIALS AND METHODS: Data were collected from the archive system of the School of Dentistry, National and Kapodistrian University of Athens in Athens, Greece. The sample included endodontically treated teeth being restored definitively at the time of data collection.

RESULTS: Statistically significant difference was found regarding the type of restoration between initial endodontic treatments and retreatments (P < .001).

CONCLUSION: Endodontic retreatment seemed to have a significant effect on the choice of definitive restoration of the tooth.


PURPOSE: To compare bleeding on probing (BoP), probing depth (PD; >= 4 mm), radiographic (peri-implant crestal bone loss [CBL]), and immunologic inflammatory (interleukin-1beta [IL-1beta] and matrix metalloproteinase-9 [MMP-9]) parameters around dental implants with cement-retained (CR) and screw-retained (SR) implant-supported crowns.

MATERIALS AND METHODS: Based on the mode of retention of the restoration, 51 patients were divided into two groups: Group 1, consisting of 26 single implants restored with CR crowns, and Group 2, consisting of 25 single implants restored with SR crowns. Peri-implant BoP, PD, and CBL were scored, and levels of IL-1beta and MMP-9 in the peri-implant crevicular fluid (PICF) in both groups were measured in duplicate using enzyme-linked immunosorbent assay. Full-mouth mechanical debridement was performed biannually in both groups. Statistical analysis was performed using Kruskal-Wallis test with the significance level set at P < .05.

RESULTS: The mean CBL among implants in groups 1 and 2 was 1.7 +/- 0.5 mm and 1.7 +/- 0.4 mm, respectively. There was no statistically significant difference in mean BoP, PD, and CBL among implants in both groups (P > .05). There was no statistically significant difference between groups 1 and 2 in the PICF levels of IL-1beta (7.3 +/- 0.5 and 7.2 +/- 0.5, respectively) and MMP-9 (165 +/- 9.4 and 182 +/- 10.6, respectively) (P > .05).

CONCLUSION: The mode of retention of implant-supported crowns does not appear to affect their clinical correlations with BoP, PD, CBL, and levels of IL-1beta and MMP-9 in the PICF when zinc oxide eugenol cement is used.


OBJECTIVE: Filled MOD restorations show near-complete recovery of tooth strength relative to the newly prepared, unfilled state. The present study examines the underlying mechanics of this recovery by more closely quantifying the mode of splitting fracture from the cavity base. By understanding the role of specific cavity dimensions on fracture resistance, useful clinical guidelines concerning MOD morphologies are formulated.

METHODS: A systematic in vitro study is made of the load-bearing capacity of filled and unfilled MOD cavities by axially loading extracted molar teeth with a hard metal ball. Filled and unfilled cavities are considered as bounding cases. Focus is placed on drillings with rectangular or rounded tips, covering a range of cavity widths and depths. The failure process is monitored during loading by a video camera, enabling the entire damage evolution from first contact to ultimate failure to be recorded.
SIGNIFICANCE: While respecting the widely accepted clinical practice of drilling cavities with internal widths less than one third that of the entire tooth, a stronger correlation is obtained between critical splitting load $P_{C}$ and ratio of cavity wall thickness $h$ (distance between cavity wall and outer tooth surface) to cavity depth $D$. Imposing a conservative upper limit on $P_{C}$ for tooth survival, the study recommends that MOD cavities be prepared such that the ratio remains in the region $h>D$, regardless of the tooth size.


PURPOSE: Although digital aids can help surgeons compensate for the shortcomings of traditional mandibular reconstruction techniques to perform surgery more precisely and effectively, the use of these digital techniques has often been fragmented, divided, and incomplete. This article describes the workflow of a fully digital mandibular reconstruction to explore the proper indications and discusses innovations based on the accuracy and effectiveness of digital techniques.

MATERIALS AND METHODS: A restoration-oriented mandibular reconstruction was performed by applying different digital techniques. Preoperative virtual surgery and rapid prototyping were used to aid the vascularized iliac bone graft surgery, which offered a solid basis for the ensuing treatment. Subsequently, implant rehabilitation was accomplished with the assistance of computer-assisted design and manufacture, laser treatment, and selective laser melting techniques.

RESULT: The workflow of the fully digital mandibular reconstruction successfully achieved a restoration-oriented treatment. These predictable, accurate, and effective digital techniques improved the consistency of pretreatment design and follow-up treatment. The treatment sequence achieved high predictability and reproducibility owing to the use of digital techniques.

CONCLUSION: This study shows that a digital workflow can be predictable, accurate, and effective, which suggests that it could be a valid digital protocol for developing a treatment sequence for patients with jaw defects caused by trauma, congenital anomalies, or mandibular tumor resection.


This multicenter retrospective clinical study aimed to evaluate the clinical performance of zirconia abutments in anterior and posterior regions, focusing on implant-abutment connections and restoration vertical height (RVH). Six experienced prosthodontists used 965 computer-aided design/computer-assisted manufacture zirconia abutments in 601 patients. Different surgical approaches were taken according to the needs of each patient. The final restorations were
all-ceramic single crowns and short-span fixed dental prostheses. Screw-retained restorations were mainly used in anterior areas, whereas cemented prostheses were chosen in cases where the implant position was not ideal. Different types of implant-abutment connections were compared: external, internal with metal components, and internal full-zirconia conical connection. All the restorations were followed up for 4 to 10 years. Technical and biologic complications were assessed in relation to several biomechanical variables, such as RVH. Differences between groups were statistically analyzed, and longevity of abutments was evaluated according to Kaplan-Meier survival analysis. Zirconia abutments resulted in overall survival and success rates of 98.9% and 94.8%, respectively. External connections reported survival and success rates of 99.7% and 94.5%, internal metal connections 99.8% and 95.5%, and internal zirconia connections 93.1% and 93.1%, respectively. Overall complication rates of 1.14%, 3.42%, and 0.62% were reported for fractures, chipping, and unscrewing, respectively. The external connection showed the longest survival while the internal zirconia connection showed the highest fracture incidence over the observation period. The clinical risk limit of RVH was identified as 14 mm. Zirconia abutments showed satisfactory clinical performance in anterior and posterior regions after 4 to 10 years. RVH and connection type influenced the clinical longevity of restorations; in particular, internal connections with secondary metallic components reduced the incidence of complications.

24. Linkevicius T.
The Novel Design of Zirconium Oxide-Based Screw-Retained Restorations, Maximizing Exposure of Zirconia to Soft Peri-implant Tissues: Clinical Report After 3 Years of Follow-up.
Current use of zirconium oxide (ZrO2)-based screw-retained restorations does not guarantee maximum contact of soft peri-implant tissues with ZrO2, because veneering porcelain usually covers the major subgingival part of the restoration. Ceramics preclude direct interaction between zirconia and soft tissue cells, thus reducing biocompatibility and benefit to the patient. The four case reports discussed in this article describe the new design modality of the ZrO2 screw-retained restorations, in which zirconia is exposed to the tissues and no veneering porcelain is located below the gingival margin. The article also shows the impact of this treatment on soft peri-implant tissues after 3 years of follow-up. Soft tissue recession, vestibular contour, bleeding on probing, and probing depth were evaluated.

25. Hartrick NE, Acker SR.
Digital Mandibular Arch Restoration at an Increased Occlusal Vertical Dimension in One Visit.
This case demonstrates how a fully digital technique was used to restore the mandibular arch to proper function and improved esthetics. The initial treatment plan to restore implants replacing the lower right molars had to be altered due to space limitations. A direct deprogrammer was utilized to determine the proper jaw relationship at an acceptable occlusal vertical dimension. A computer-aided design system was employed to digitally create and fabricate implant/abutment-supported cement-retained lithium-disilicate crowns, toothsupported lithium-disilicate crowns, and screw-retained hybrid abutment lithium-disilicate crowns in one visit.

26. Magne P, Cheung R.
Numeric simulation of occlusal interferences in molars restored with ultrathin occlusal veneers.  

**STATEMENT OF PROBLEM:** Selecting material for a minimally invasive occlusal veneer reconstruction concept requires an understanding of how stresses are distributed during functional and parafunctional forces.  

**PURPOSE:** The purpose of this in vitro study was to investigate stress distribution in a maxillary molar restored with ultrathin occlusal veneers and subjected by an antagonistic mandibular molar to clenching and working and nonworking movements.  

**MATERIAL AND METHODS:** A maxillary first molar was modeled from microcomputed tomography (micro-CT) data, using medical image processing software, stereolithography editing/optimizing software, and finite element software. Simulated ultrathin occlusal veneer materials were used. The mandibular molar antagonist was a solid nondeformable geometric entity. Loads simulated clenching, working, and nonworking movements with loading of 500 N. The values of the maximum principal stress were recorded.  

**RESULTS:** In the clenching load situation, maximum tensile stresses were located at the occlusal veneer (52 MPa for composite resin versus 47 MPa for ceramic). In the working movement, significant additional tensile stresses were found on the palatal root (87 MPa for composite resin and 85 MPa for ceramic). In the nonworking movement, tensile stress on the ultrathin occlusal veneer increased to 118 MPa for composite resin and 143 MPa for ceramic veneers. Tensile stress peaks shifted to the mesiobuccal root (75 MPa for composite resin and 74 MPa for ceramic).  

**CONCLUSIONS:** The topography of stresses generated by the various occlusal interferences were clearly identified. Significant tensile stress concentrations were found within the restoration's occlusal topography and root, with the nonworking interference being the most harmful and also the most revealing of the difference between the composite resin and ceramic ultrathin occlusal veneers.

27. Culshaw S.  
*Periodontal Disease: Its Impact on Restorative Dentistry.*  
A healthy periodontium provides stable gingival margins and stable tooth position prior to tooth preparations for indirect restorations. Good periodontal health allows easier tissue handling during tooth preparation, impression taking and restoration fitting. Periodontal health is integral to successful restorative care. This report documents common clinical scenarios in which periodontal problems cause aesthetic concern.

28. Milosevic A.  
*Abrasion: A Common Dental Problem Revisited.*  
Dental abrasion is most commonly seen at the cervical necks of teeth, but can occur in any area, even inter-dentally from vigorous and incorrect use of dental floss. Acid erosion has been implicated in the initiation and progress of the cervical lesion, while tooth-brush abrasion has long been held as the prime cause of cervical abrasion. Identification of the risk factors is clearly important in order to modify any habits and provide appropriate advice.

29. Milosevic A.  

A review of risk factors and management of acid erosion. Particular emphasis is placed on the use of direct composite as a reversible and relatively straightforward restorative option.

30.  
Shearer A.  
Guest Editorial.  
*Primary Dental Journal* 2017 Feb 28;6(1):5-6.

31.  
Shelley A.  
Restoration of Endodontically-Treated Anterior Teeth.  
Detailed consideration of a case involving the restoration of an endodontically-treated maxillary canine tooth provides opportunity to review the many different considerations and treatment options in such situations. The restoration of endodontically-treated anterior teeth must be patient-centred, applying materials and techniques best suited to achieve a successful clinical outcome.

32.  
Shelley A.  
Restoration of Endodontically-Treated Posterior Teeth.  
*Primary Dental Journal* 2017 Feb 28;6(1):54-61.  
A case study provides opportunity to discuss treatment planning and the selection of materials and techniques to provide a replacement restoration of an endodontically-treated molar tooth. The discussion highlights treatment options along with the strengths and weaknesses of the alternative approaches to achieving a successful clinical outcome.

33.  
Wilson N.  
Editorial.  

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Retrospective Study to Determine Patient Satisfaction of Immediately Placed and Provisionalized Implants in the Esthetic Zone From a US Private-Practice Research Network.  
BACKGROUND: Immediately placed/immediately restored dental implants in the esthetic zone are judged by not only their functional success but also the appearance and acceptance of the restorative outcome. The purpose of this study was to retrospectively evaluate in a private-practice setting the satisfaction of both patients and doctors regarding immediately placed/immediately restored implants in the esthetic zone.

METHODS: The author group consists of nine board-certified periodontists. Each private practice contributed to the patient population of this study through a primarily referral-based source. In a 6-month period, practices evaluated patients who were candidates for dental implant replacement with teeth Nos. 5 through 12 scheduled for extraction. All patients received informed consent and were asked if their data could be used with a visual analog scale (VAS) they graded. Pretreatment and 6-month post-final restoration loading was compared for statistically significant changes in reference to crestal bone changes, papilla index score (PIS), facial gingival margin stability (FGMS), and investigator/patient esthetic evaluations using a VAS.

RESULTS: Thirty-five patients were included in the study with a total of 35 implants placed and 32 restored with a final restoration. Implants were followed for an average of 15.4 months prior to reporting. A total of three failures were encountered. The PIS resulted in an average score of 2.7. VAS resulted in an average score of 9.3 by the surgeons and 9.5 by the patients. The FGMS accounted for 76% of the implants with no change, 15% demonstrating recession, and 9% demonstrating coronal migration.

CONCLUSIONS: Immediately placed and immediately temporized implants in the esthetic zone demonstrated a successful outcome that was highly acceptable to patients in private-practice settings from a diverse group of private periodontal practices.


PURPOSE AND OBJECTIVE: The aim of this in vitro study was to investigate the ability of epithelial cells to attach to or proliferate on various mechanical or chemical surface treatments of an implant provisional material.

MATERIALS AND METHODS: Polyethyl methacrylate discs 10 mm in diameter and ~0.2 to 0.75 mm in width were used in the study. Experimental discs were treated with either a mechanical (pumice, varnish for shine, or high polishing) or a chemical agent (alcohol, chlorhexidine, or steam) to provide cleaning and/or polishing. Using primary human epidermal keratinocytes, experiments were performed to test the adhesion or proliferation of cells on the discs with various surface treatments.

RESULTS: Scanning electron microscope analysis, rhodamine staining, and cell counting using a hemocytometer corroborated all findings and illustrated that the highest cell adhesion was found to be in the smooth surface treatment groups and the poorest adhesion was found to be in the rough surface groups and chemical treatment group.

CONCLUSION: Within the limitations of this study, the following clinical protocol is recommended for finishing, polishing, and disinfecting implant provisional restorations: coarse, medium, fine pumice -> high polishing (if desired) -> steam. It is recommended to avoid applying varnish in the perimucosal area near the epithelium. This study could establish the most appropriate way to handle provisional restorations in the peri-implant sulcus for improved soft tissue health, esthetics, and long-term stability.

The aim of this study was to evaluate the longevity of teeth with single-visit endodontic and restorative treatment under general anaesthesia (GA) for special needs patients and to investigate factors associated with survival and success. Data were collected from 381 teeth in 203 patients [mean (s.d.) age = 27.0 (14.1)]. All endodontic and restorative procedures were performed during a single GA session except for cementation of crowns in the cases requiring crown restoration (38%). A total of 267 teeth (70.6%) were followed-up for 6-81 months [mean (s.d.): 32.7 (20.0)]. Patients and teeth with and without follow-up were compared. Kaplan-Meier analysis with generalised Wilcoxon test was used to compare the mean survival and success period. Cox proportion hazard regression model was applied for multivariate analysis. At the end of the observation period, 10 teeth had a crown fracture (5-year survival rate = 89.8%), and an additional 10 teeth had primary or secondary caries (5-year success rate = 86.4%). Risk factors associated with survival were age (>40), non-parental caregiver, cooperation level and periodontal disease. A soft diet was an additional risk factor against the success of teeth. Single-visit endodontic and restorative treatment under GA showed favourable outcomes, suggesting a promising treatment option for special needs patients. Patient- and dental-specific circumstances need to be carefully considered to enhance the longevity of reconstructed teeth.


OBJECTIVE: The objective of this randomized controlled prospective trial was to evaluate the durability of a low shrinkage and TEGDMA/HEMA-free resin composite system in posterior restorations in a 6-year follow up.

METHODS: 139 Class II restorations were placed in 67 patients with a mean age of 53 years (range 29-82). Each participant received at random two, as similar as possible, Class II restorations. In the first cavity of each pair the TEGDMA/HEMA-free resin composite system was placed with its 3-step etch-and-rinse adhesive (cmf-els). In the second cavity a 1-step HEMA-free self-etch adhesive was used (AdheSe One F). The restorations were evaluated using slightly modified USPHS criteria at baseline and then yearly during 6 years. Caries risk and parafunctional habits of the participants were estimated.

RESULTS: Three molar teeth showed mild post-operative sensitivity during 3 weeks for temperature changes and occlusal forces. After 6 years, 134 Class II restorations were evaluated. Twenty-one restorations, 8 cmf-els (11.4%) and 13 ASE-els (20%) failed during the 6 years (p<0.0001). The annual failure rates were 1.9% and 3.3%, respectively. The main reasons for failure were fracture followed by recurrent caries. Most fractures and all caries lesions were found in high risk participants.

SIGNIFICANCE: The Class II resin composite restorations performed with the new TEGDMA/HEMA-free low shrinkage resin composite system showed good durability over six years.


PURPOSE: To assess the fracture resistance (FR) and cusp deflection (CD) of lined or non-lined composite (CO) and glass hybrid (GH) restorations over residual demineralized dentin.

MATERIALS AND METHODS: In 48 extracted human premolars, artificial residual demineralized dentin was induced on pulpo-axial walls of standardized
cavities. Various restorations were placed over this demineralized dentin: an experimental GH, a composite restoration (OptiBond FL+Tetric EvoCeram) without lining, or composite restorations with non-setting (Hypocal) or setting (Dycal) calcium hydroxide lining. After thermomechanical cycling, groups (n = 12) were compared regarding their CD and FR.

RESULTS: CD did not differ significantly between groups. FR was significantly lower in teeth restored with GH (median: 238 N; 25th/75th percentiles: 191/287 N) than in those restored with lined or non-lined composites (median range: 517-569 N; p < 0.05/Mann-Whitney), which did not differ significantly from each other (p > 0.05).

CONCLUSION: Within the conditions of this in vitro study, CH lining of pulpo-axial walls had only limited impact on CD and FR. GH showed the lowest FR and might not be optimal for restoring deep or extended cavitated lesions.


OBJECTIVE: To compare the effect of Papacarie and Atraumatic Restorative Treatment (ART) on pain and discomfort during caries removal among children.

STUDY DESIGN: Fifty healthy, 4-8 year-old children were equally and randomly allocated to Papacarie and ART to remove caries from decayed primary teeth. A randomized, controlled, blinded, two parallel-arms clinical trial was conducted in the clinic of the Pediatric Dentistry and Dental Public Health Department, Alexandria University, Egypt in March 2014. Pain and discomfort were assessed blindly by two independent investigators watching videotaped treatment sessions using the Sound, Eye and Motor scale (SEM). Their reliability was assessed using Kappa statistics. The effect of caries removal methods, time spent to remove caries and other confounders on SEM score was assessed using regression analysis.

RESULTS: Mean time to remove caries using Papacarie and ART was 5.8 and 4.8 minutes, P = 0.005. Median Paparie and ART scores for the S, E and M components were 1, 1, 1 and 3, 2, 3. Adjusted mean SEM score = 3.6 and 7.8, P <0.0001. Method of caries removal was the only factor significantly affecting pain and discomfort.

CONCLUSION: Papacarie is associated with minimal pain during caries removal from primary teeth compared to ART, although it has longer working time.


OBJECTIVES: To assess the current choice of various restoration materials among Israeli pediatric dentists according to seniority and specialty.

STUDY DESIGN: Participating dentists completed a 23-item questionnaire on their qualifications, type of practice and preference of restorative material.

RESULTS: Seventy-five dentists (average age 46.27 +/- 12.6 years, 58 females) participated. Forty-one were specialist pediatric dentists and 34 were general practitioners. Amalgam was preferred by 49.3%, followed by composite (41.3%), glass ionomer cement (5.3%) and compomer (4%). Only 13.3% of the dentists thought amalgam bears environmental and health hazards, compared to 49.3% for composite. Satisfaction was high for amalgam and composite, less for glass ionomer cements and least for compomer. General practitioners preferred amalgam (70.6%) while pediatric dentists preferred composite (51.2%), P < 0.003.

CONCLUSIONS: Amalgam and composite were the materials of choice among the participating Israeli dentists. Most of them (86.7%) responded that
amalgam does not possess any health issues. Their satisfaction with the restoration materials was highest for amalgam and composite, a choice significantly affected by whether they were in general practice (amalgam) or specialized in pediatric dentistry (composite).

41.
OBJECTIVE: To evaluate the degradation of three resin based restorative materials by S Mutans.
STUDY DESIGN: Class I cavity was prepared in extracted premolars and were randomly divided into 3 groups (Group I - Conventional composite (CC), Group II - Resin Modified GIC and Group III-Giomer). Teeth were then restored by respective restorative material and equally divided in two subgroups (Control and Experimental). Experiment subgroup samples were then incubated in 2 ml of BHI with 1:10 dilution of SM (MTCC-497) grown overnight in BHI whereas control subgroup samples were incubated in BHI without SM. The incubation solution was collected at 2, 14 and 30 days interval, and the analysis for identification and quantification of Bis-HPPP was done by High performance Liquid Chromatography.
RESULTS: Statistical analysis of the collected data revealed a statistically increased Bis HPPP production in the presence of SM in all the tested materials, with minimum in Resin Modified GIC and a maximum in Conventional Composite (CC).
CONCLUSION: SM degrades the resin based restorative materials & among the tested materials Resin Modified GIC appears to be most Biostable.

42.
BACKGROUND: The aim of this study was to evaluate the clinical effects of deproteinization of the hypomineralized enamel and different cavity designs on the performance of the composite resin restorations(CRRs) placed into the cavities of MIH (molar incisor hypomineralization)-affected molars.
STUDY DESIGN: 95 MIH-affected permanent first molars (PFMs) and 31 caries but not MIH-affected PFMs (126 teeth in total) were included in the study. The MIH-affected molars were divided into three groups. In Group I, all hypomineralized tissue was removed until healthy enamel was reached. In Group II, carious and cheesy hypomineralized tissue was removed until a reasonable resistance was detected in the hypomineralized tissue. In Group III, cavities designed as Group II, differently from this group deproteinization of the left hypomineralized tissue was performed prior to the placement of CRRs. Group IV served as the control group consisting of unaffected carious PFMs. Restorations were evaluated according to modified USPHS criteria for 24 months.
RESULTS: The retention rates were 93.7% for Group I, 80.7% for Group II, 93.5% for Group III and 100% for Group IV. The success rate for the restorations in Group II proved significantly lower (p<0.05) than that of the other three groups. No significant difference in success rates was observed between Group I, Group III and Group IV (p>0.05) at the end of 24 months.
CONCLUSIONS: Failure of the restorations was predominant in the group that the hypomineralized tissue was left surrounding the cavities. Deproteinization of the hypomineralized enamel was found to enhance the retention rates of CRRs.

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Tal E, Kupietzky A, Fuks AB, Tickotsky N, Moskovitz M.
Clinical Performance of Heat-Cured High-Viscosity Glass Ionomer Class II Restorations in Primary Molars: A Preliminary Study.

OBJECTIVES: The present preliminary study evaluated the clinical and radiographic performances of heat-cured high viscosity glass ionomer (HCHVGI) in class II restorations of primary molars.

STUDY DESIGN: A retrospective study on a cohort of patients who had dental caries restored at a private practice was conducted. Restorations were evaluated radiographically and photographically by two separate examiners.

RESULTS: Ninety-three Class II restorations in 44 patients (average age: 108 months +/- 25.3, 24 males, 20 females) were examined. Average recall time was 22.2 months +/- 4.2. All but three restorations (96.8%) were present and intact, with no incidents of secondary caries. Three additional restorations had occlusal defects that required retreatment, resulting in an overall success rate of 93.5%. Ninety-seven percent of the restorations were rated optimal for marginal integrity with no staining of the restoration surfaces. No patients complained of post-operative sensitivity. The most common flaw found was a concavity on the proximal wall of the cavity box (27%, mean age 16 months +/- 3.9).

CONCLUSION: The findings in this preliminary study suggest that heat cured high viscosity glass ionomer cement may be an effective restorative material for Class II restorations in primary molars that are a year or two from shedding.

44. Thakur R, Patil SDS, Kush A, Madhu K.
SEM Analysis of Residual Dentin Surface in Primary Teeth Using Different Chemomechanical Caries Removal Agents.

BACKGROUND: The purpose of this in vitro study was to analyze the residual dentinal surfaces following caries removal using two chemomechanical methods (Papacarie Duo and Carie Care), by scanning electron microscopy (SEM).

STUDY DESIGN: Twenty extracted primary molars with active occlusal carious lesions were randomly assigned two groups depending on the CMCR agent used for the caries excavation - Group 1 - with Papacarie Duo and Group - 2 with Carie Care. After the caries excavation, the specimens were subjected to SEM analysis.

RESULTS: Though both the agents showed the minimal smear layer with the patent dentinal tubules, Carie care showed patent dentinal tubules with a clearly exposed peritubular and intertubular collagen network.

CONCLUSION: Carie Care treated surface exhibited better surface morphology of residual dentin.

45. Zimmermann M, Koller C, Mehl A, Hickel R.
Indirect zirconia-reinforced lithium silicate ceramic CAD/CAM restorations: Preliminary clinical results after 12 months.

OBJECTIVE: No clinical data are available for the new computer-aided design/computer-assisted manufacture (CAD/CAM) material zirconia-reinforced lithium silicate (ZLS) ceramic. This study describes preliminary clinical results for indirect ZLS CAD/CAM restorations after 12 months.

METHOD AND MATERIALS: Indirect restorations were fabricated, using the CEREC method and intraoral scanning (CEREC Omnicam, CEREC MCXL). Sixty-seven restorations were seated adhesively (baseline). Sixty restorations were evaluated after 12 months (follow-up), using modified FDI criteria. Two groups were established, according to ZLS restorations’ post-processing procedure prior to adhesive seating: group I (three-step polishing, n=32) and group II
(fire glazing, n=28). Statistical analysis was performed with Mann-Whitney U test and Wilcoxon test (P<.05).

RESULTS: The success rate of indirect ZLS CAD/CAM restorations after 12 months was 96.7%. Two restorations clinically failed as a result of bulk fracture (failure rate 3.3%). No statistically significant differences were found for baseline and follow-up criteria (Wilcoxon test, P>.05). Statistically significant differences were found for criteria surface gloss for group I and group II (Mann-Whitney U test, P<.05).

CONCLUSION: This study demonstrates ZLS CAD/CAM restorations have a high clinical success rate after 12 months. A longer clinical evaluation period is necessary to draw further conclusions.