Electronic Cigarettes and Prosthodontics: an update of the current literature, an audit of reporting and staff knowledge and analysis of the erosive potential of e-liquids

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Electronic cigarettes (e-cigarettes) are devices that deliver a vapour containing nicotine, flavourings and diluents. Since their introduction in 2006 they have seen a significant rise in popularity with an estimated 2.1 million users in the United Kingdom.

The aims of this study were twofold: firstly to determine if e-cigarette usage was being recorded in the medical records and to determine staff/student knowledge, and secondly selected e-liquids were analysed for their erosive potential.

Round 1: 464 patients each completed a questionnaire prior to their clinical visit. Their medical records were later examined for evidence of e-cigarette reporting. 50 staff and 50 students were asked a series of simple questions to determine their knowledge.

Intervention: Staff lunchtime talks and undergraduate lectures delivered.

Round 2: 150 patients and 20 staff/ 20 students.

Approximately 5% of the patients sampled were using an e-cigarette in both rounds. Recording rates were 28% in the first round and improved to 50% in the second round. Staff knowledge was mixed in both rounds.

E-cigarette usage is poorly recorded in the medical records. Staff and students knowledge is mixed.

E-liquid analysis measured the pH and titratable acidity of a range of nicotine containing solutions (e-liquids) manufactured for electronic cigarettes.

The average pH of the e-liquids was pH 7.43, with a range from pH 4.42 to pH 8.86. Four e-liquids had a pH<7. The 'e-liquid with the largest buffering capacity required 217µl of 0.1M NaOH to reach pH 5.5 and an additional 600µl to reach pH 7.

The majority of the e-liquids tested were neutral or slightly alkaline. We identified four acidic e-liquid solutions, all being custom mixtures ordered off the internet, from the same manufacturer. The buffering capacity of the acidic e-liquids, to get to the critical pH of 5.5, was relatively small, approximately a tenth that of orange juice. The clinical relevance of these results needs to be investigated further.

A Novel Zirconia Dental Implant Design For Immediate Single Tooth Replacement in the Aesthetic Zone: Research and Clinical Perspectives

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In collaboration with industrial partners, we introduced and investigated a new implant system with a novel biomechanical design in an attempt to exploit the promising properties of zirconia and overcome the drawbacks associated with the other commercially available systems. The proposed design utilises a relatively low strength glass fibre composite abutment bonded with resin cement to an injection-moulded, soft tissue level, zirconia implant. This design can theoretically reduce catastrophic failures affecting the implant and favour retrievable failures that are confined to accessible areas above the engineered weak connection. In terms of surface treatment, implants have acid-etched surface (MDS: Maxon Dental Surface) which exhibited superior osseointegration capacity in comparison to machined zirconia. Findings may answer some pressing concerns including;

- Mechanical reliability of the system and durability of the connection between the different components given the poor bonding capacity to zirconia. A long-term dynamic fatigue tests was performed on samples prepared in a similar manner for clinical application
- The effect of low-temperature degradation or ageing phenomenon on the performance of the characteristics of the material using cutting edge crystallographic and nano-mechanical studies
- The ability to achieve rough surface using non-invasive methods to improve peri-implant tissue response given the lack of efficiency of normal roughening techniques when used on conventional zirconia materials
- The White Implant Development Corp, The Netherlands and Maxon Dental, Germany

3-D printing of a copy denture template; a case history

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Conceived in the USA, the 'copy denture technique' was adapted and developed in the UK by stalwarts of BSSPD John Heath foremost in advocating its use. Papers continue to recommend the technique because of the perceived advantage of accurately reproducing the polished surfaces of the dentures and so allowing patients to easily adapt to their new denture. However, Kippax investigated and Polyzois compared the accuracy of reproduction of dentures; both found the technique did not produce accurate copies. Although a useful method of denture construction, the problem of inaccuracy in the reproduction of the denture templates remains. If the polished surface shape could be maintained, patients would benefit.An inexpensive, high resolution optical scanner coupled with 3-D printing offers the opportunity to rapidly and cost-effectively print denture templates for use in the copy denture technique. This paper presents a case using a printed denture template. A structured light 3D scanner was constructed using a projector (Vivitek Qumi Q5, Vivitek Corporation, Hoofddorp, NL) and two cameras (uEye 1240LE, IDS Imaging, Obersulm, Germany). Software was written to triangulate the data, with a point density sampling of 50μm. The denture was printed using a stereolithographic printer (DWS 020D, DWS Systems, Vicenza, Italy) which supports an X-Y resolution of 50μm, and a slice thickness of 10μm.

The printed template was substituted for the normal denture template and the copy denture produced in the usual way. The advantage of the solid and accurate copy denture template facilitated a precise replication of the original denture; in particular on the polished surfaces.

This technique of producing a copy denture template has proved to be convenient and low cost with the advantage of a more accurate template. The challenge for this research is to make the technology more readily available in the market place.

The Denture Cleanliness Index

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We outline a method for determining the quality of patients denture hygiene and assessing their compliance to given denture hygiene instructions.

The Denture Cleanliness Index aids in assessing patient's compliance to denture hygiene instructions. The DCI semi-quantitatively grades the severity of denture hygiene according to staining of the denture fit surface, which is stained using a plaque disclosing solution. Scores range from 0-4, with 0 equating to optimal denture cleanliness and 4 indicating calculus present.

The DCI has been utilised in 3 separate situations, primary care, secondary care, and tertiary district hospital care; and its clinical use has been evaluated.

Primary and secondary care DCI scores indicated denture hygiene was less than optimal at baseline, and improved after intervention at 1-month review. Similar results were observed for oncology patients seen in a tertiary care at a regional head and neck unit within a general hospital setting.

The DCI allowed for quick evaluation of denture hygiene, and allowed for determining compliance to given denture hygiene instruction.

Denture hygiene instructions as well as oral hygiene instructions worked well especially in patients that are treated in a multidisciplinary environment.

The DCI is a quick and simple method for assessing denture hygiene, patient compliance, and as an objective patient motivational tool.

Dentures are medical devices, and medico-legally, denture hygiene instructions (DHI) should be demonstrated to and by patients; the DCI can be utilised as a toolkit to aid in record keeping and delivery of DHI

Additional medium to long term studies with larger cohort sizes are needed to further evaluate the effectiveness of the DCI scoring system.

Implant Utilization and Time to Oral Rehabilitation in Conventional and Advanced Fibular Free Flap Reconstruction Techniques of the Maxilla and Mandible

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Conventional fibular free flap reconstruction (FFFR) for head and neck tumours (HNT) has often lead to suboptimal results and increased surgical times due to the imprecise planning. Over the past decade, FFFR involving the jaws has evolved in the planning, surgical reconstruction and oral rehabilitation techniques. This shift has been shown to improve the accuracy and reliability of the preoperative plan that can reduce the number of surgeries and lead to a more precise operative result. In the advanced technique, a virtual surgical plan for resection and reconstructive surgery is created using a 3D application and Surgical Design and Simulation (SDS) which will include osseointegrated implant oral rehabilitation. This pathway uses advanced digital computer programs, planning and rapid prototyped devices. Both the FFFR techniques aim to reconstruct the patient's defect, restore function and aesthetics with oral rehabilitation. The purpose of this study was to compare implant utilization and time to oral rehabilitation between conventional (non-SDS) and advanced (SDS) FFFR techniques for the treatment of HNT patients.

19 subjects with HNT were selected. Two examiners evaluated the outcome data using archival clinical records and photographs. Eight of the subjects were included in the SDS group and 11 were in the non-SDS group. In the SDS group, two of the eight subjects had a history of radiation therapy (RT) and six of the eleven subjects in the non-SDS underwent RT as part of their HNT treatment. The primary outcome measures assessed were implant utilization (difference in number of implants installed and number of implants connected to the implant prosthesis) and time to oral rehabilitation (time from

FFFR to placement of implant prosthesis). Secondary measures assessed were patient demographics.

There was a significant difference in the implant utilisation between the two groups (t= 2.456 , df= 12, p= 0.03, two-tailed). In the SDS group, 97% of the implants were utilized compared to 76% of the implants in the non-SDS group. Eight subjects in the SDS group were recorded to have 33 implants pre-planned for installation, 32 were installed and 31 were connected to implant prostheses. Eleven subjects in the non-SDS group had 36 implants planned to be installed, 49 were installed and 37 were connected to implant prostheses. For the time to oral rehabilitation, there was a significant difference between the two groups with average time of 9months for the SDS group and 55months for the non-SDS group.

This study showed a higher implant utilization and earlier time to oral rehabilitation in the SDS group. Longer follow-up data and a larger sample are needed to assess treatment outcomes in the advanced reconstructive technique. Future studies on health economics and health technology assessment for advanced techniques in jaw reconstruction and rehabilitation will further assist in bringing advanced jaw reconstruction techniques to the international HNT reconstruction community.

Evaluation of the shear bond strength of two adhesives to different dentine substrates

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The aim of this in vitro study was to evaluate the shear bond strength of a resin-modified glass ionomer and an etch-and-rinse bonding agent to normal and previously eroded dentine, with or without pumice surface treatment, used to bond direct resin composite restorations. 120 human dentine specimens were created and divided into eight equal-sized groups. Sixty specimens comprised a non-eroded group (NE) while the remainder were immersed in an erosive solution (E) before use. Prior to the bonding of a resin composite cylinder (3x3 mm), all specimens were stored in distilled water at 37°C. Subsequent composite bonding followed the application and curing of either Adper Scotchbond Multipurpose (3MESPE, St Paula, USA) or Vitrebond (3MESPE, St Paula, USA) directly to the dentine surface or following pumice treatment. All specimens were then stored for seven days in distilled water at 37°C prior to undergoing a shear bond strength test conducted using a universal testing machine at a crosshead speed of 1mm min-1). The shear bond strengths varied between 6.75 ± 5.32 MPa (E pumice/ Vitrebond) and 2.81 ± 3.27 MPa (NE direct Vitrebond). A one-way ANOVA revealed significant differences ($P < 0.05$) between the groups. Pairwise analysis demonstrated a significant difference between E dentine treated with pumice/ Vitrebond and the NE directly placed Vitrebond groups ($P < 0.05$). Weibull analysis demonstrated that the most reliable bond to E specimens was achieved following pumice/ Vitrebond application (Weibull modulus= 7.50, SE= 0.21, mean shear bond strength= 6.75 ± 5.23 MPa), and for the NE specimens when using Scotchbond without surface treatment (Weibull modulus= 5.91, SE= 0.32, mean shear bond strength= 5.05 ± 3.54 MPa). Within the limitations of this study, Vitrebond may be considered a promising alternative to etch-and-rinse adhesives when treating erosive dentine wear and pumice pre-treatment may improve this bond.

Mineral Grafting Versus xeno-grafting in small and medium loss of substance

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The rehabilitation of different forms of edentulous, but also of the intra-oral substance losses requires a complex clinical algorithm, a great importance for the clinical result belonging to the specific preparation stage out of regard of the implantation. This study is part of a vast research quantifying through computer programs and 3D modelling the integration degree of augmentation materials in the case of rehabilitation of small and medium oro- maxilo -facial substance loss in the contextual biomechanical behaviour of different types of prosthetics.

The study aims at a comparative analysis of the usage of mineral grafting or of the xeno-grafting, selection dictated by the specific features of the clinical case and the therapy solution chosen. An important role in the selection of one category or the other of grafting is due to the cito-architecture of the intra-oral substance loss or the degree of re-absorption and the atrophy of the edentulous ridge, associated with the use of the collagen membranes or of the titan mesh. During the first stage, a mathematical model was created in order to reiterate the clinical situation of the case which is about to be solved. This was doubled by experiments on animals in order to evaluate the pressures exerted during different fixed or mobile therapeutic solutions, correlated with different types of applied implants, quantifying the degree of re-absorption and bone re-modelling post-grafting with one type or another of substitutes. The second stage aims a representative number of cases (300 patients) to which it was applied the therapy solution of election and the type of grafting according to the factorial sum which influences the therapy results. In this study we used 3D Robodent navigation system, designed so as to increase the degree of accuracy of the insertion of dental implants and to quantify the degree of bone density. The selection of mineral grafting or the xeno-grafting is dictated by the particularity of the clinical case. The positive evolution of the case is fully according to the type and number of implants used and, of course, the prosthetic solution chosen and anchored in the field of the fixed or mobile prosthetics in the field of the meto-ceramic or entirely non-metallic biomaterials.

The binominal material grafting – mucous-bone support structure influences in a decisive way the evolution of the clinical case. The success of the final result depends on the surgical technique used and the selected prosthetic solution. The use of the 3D navigation system ensures the real-time visualization of the intervention of implantation, accuracy, precision and reducing working time compared to classical technique.

The effects of bulk on the dimensional stability of Pattern Resin used in the construction of verification jigs

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Osseointegrated dental implants have been used successfully to replace missing teeth worldwide and have demonstrated excellent long-term clinical survival. However, several studies highlighted numerous mechanical and biological complications attributed to the lack of passive fit of framework of implant supported fixed prosthesis.

Several methods have been suggested to improve the fit of implant supported prosthesis. Verification jigs are routinely used to verify the accuracy of the master cast before the metal framework is constructed although several materials are used to fabricate verification jigs. yet their dimensional accuracy in unknown.The aim of the study was to determine whether the differing bulk of added polymerising pattern resin on implant abutments when constructing verification jigs affects accuracy in verifying the spatial relationship between multiple implants. Our objectives were1. To identify the amount of distortion due to polymerisation shrinkage of autopolymerising pattern resin on custom made verification jigs.2. To determine the bulk at which the pattern resin gives a better fit of the verification jig on the Master model.

Duralay resin was used to construct 10 verification jigs each of 4 and 8 mm height on a master model. Ten further jigs were constructed using a metal rod tagged to implant abutments with a minimal amount of Duralay. The dimension of these jigs was measured using Incise dental scanner to provide a comparison.

A one-way analysis of variance (ANOVA) at $p < 0.05$ showed a significant difference between the master model and 4 mm and 8 mm Duralay jigs. Whereas there was no statistical significant difference between the Master model and the Metal rod verification jigs.

Significance of Primary Stability for Successful Osseointegration of Dental Implants: a Systematic Review

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Primary stability is considered as one of the main factors in successful osseointegration of a dental implants and its long-term successful clinical outcome.

The objective of this systematic review was to evaluate the significance of primary stability on the success or survival of dental implants.

Electronic databases were searched from 1993 up to and including May 2014 using variations of key terms. Review findings regarding study results and quality were summarized in tables by topic, using the PRISMA Statement for reporting and the Cochrane bias assessment tool for quality assessment, respectively.

From the 942 titles (1018 before removing duplicates) obtained after the database search, 76 publications were identified as potentially relevant for the focused PICO question. The evaluation of abstracts yielded 8 studies eligible for full-text analysis. Five publications met the inclusion criteria and were included in this systematic review. Most of the included studies claim, in some way, that a high level of primary stability in delayed-loaded implants raises the probability of success of an implant while a low level does the reverse. However, none of the included studies have analysed the primary stability values to the success or failure of dental implants. Although, primary stability is supposedly associated with successful osseointegration, the results of the 5 included studies limit any definitive conclusion as none of them compare the success or survival between implants with high or low primary stability. Specific studies comparing implants placed with high and low primary stability are necessary to determine the significance of primary stability as a success indicator for delayed-loaded implants.

Oral Health related Quality of Life in denture Wearers Attending a Secondary Care centre

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Appreciating patients' difficulties with conventional dentures relies on more than physical examination of the prosthesis and oral anatomy. Quantifying these issues by means of oral health related quality of life tools may help communication between patient and clinician during treatment. We aimed to investigate the impact of wearing a removable prosthesis on patients oral health related quality of life.131 consecutive patients who consented for the study completed an Oral Health Impact Profile (OHIP-14) questionnaire when attending Glasgow Dental Hospital for routine replacement of their conventional removable prosthesis. Participant demographics and denture information was also recorded. Ethical approval was granted for the study. The cohort mean age was 70.3 ±11.4 years and included 35 (46%) males. Within the sample 90 participants wore a combination of complete dentures, the remaining 41 a combination of partial dentures. The mean OHIP sum was 17.8 ± 13.7 with a range of 0-56. Gender, denture type, fit, and quantity of saliva reached a level of significance (0.05) with OHIP sum. Participants aged 50-59 years experienced the greatest impact on quality of life (24.8±13.6). Four-year-old dentures scored the greatest mean OHIP sum (20.4 ± 13.7). In general, as the number of remaining teeth decreased the greater the impact on quality of life. Many factors must be taken into consideration when considering the impact of removable prosthesis on patient's oral health related quality of life. Not all of these factors are within the clinicians' control.

The restorative management of cleft lip and palate

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Specialists in prosthodontics and restorative dentistry will often be challenged with the rehabilitation of patients who have a congenital cleft of the lip and/or the palate. The nature of the defect, missing or malformed teeth in the cleft region, arch-width discrepancies, reduced vertical dimension and the restorative status of the teeth present will often determine the complexity and restorative management of these cases.

Our aim is to present the restorative management of three multi-disciplinary cleft lip and palate cases treated in conjunction with Oral and Maxillofacial Surgery and Orthodontics and share with colleagues different treatment modalities available for this group of patients.

The three cases highlight a range of complexity these patients can often present with. All the patients were satisfied with the functional and aesthetic outcome of the treatment.

The rehabilitation of patients with cleft lip and palate is challenging and requires multidisciplinary care for optimal functional and aesthetic outcome. Moreover, with lack of robust evidence on management of these patients it is essential clinical experience is shared amongst specialists and junior trainees to increase the knowledge base.

The Oral Cancer Patient: rehabilitating the edentulous mandible with fixed superstructures

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Ablative surgery and resection of the mandible has a significant effect on the patient's function and facial aesthetics. There are a number of well-established reconstructive surgical options to restore hard and soft tissue. Dental rehabilitation is important as it can improve lower facial appearance, contour, support for the lower lip, speech and masticatory function.

Following surgical reconstruction of the mandible; lack of sulcal depth, reduced denture support area, bulky composite flaps and restricted tongue function are all challenges faced during dental rehabilitation. These factors can compromise the retention and stability of removable prostheses or make them impossible. The use of fixed implant retained superstructures can therefore have significant benefit in the rehabilitation of the mandibular arch. In this presentation, we will describe the use of fixed, implant supported superstructures to rehabilitate edentulous mandibles in surgically reconstructed oral cancer patients. The clinical stages involved will be discussed in detail and the advantages and disadvantages of using milled bars for the bridgework will be considered.

Management of cracked tooth syndrome - the use of direct resin composite

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Incomplete tooth fractures are commonly encountered in general dental practice, and it is estimated that one posterior tooth fractures in 23 adults each year.

Symptoms are often diffuse and non-specific, ranging from sensitivity to hot and cold, to a more specific pain on biting. These symptoms have given rise to the term cracked tooth syndrome (CTS). The diagnosis and treatment of teeth with CTS can be a particular challenge for the dental practitioner.

This case describes a patient who presented with poorly localised pain on biting from the upper right quadrant.

On examination the upper right quadrant was lightly restored, with no clinical or radiographic pathology of note. A tooth slooth indicated the 15 as the source of pain, and transillumination suggested a palatal cusp fracture. Results were inconclusive, so the 15 was ortho-banded, and on review, the symptoms has resolved. The 15 was diagnosed with CTS. The tooth was treated with a cusp covered direct resin composite. This was completed using Filtek Supreme XTE Universal, under rubber dam, with a Palodent Plus matrix system. On review the patient's symptoms had resolved. The diagnosis and treatment of teeth with CTS can be difficult. Treatment is particularly difficult in premolars, which, due to their size and position, provide minimal coronal surface area, and require aesthetic restorations.

There are limited long-term clinical studies on the success of restorative treatment for teeth with CTS. Several therapies have been described, including root treatment and full cuspal coverage, bonded cast or ceramic onlays, and bonded amalgam.

There is a growing body of evidence to support the use of direct resin composite for the restoration of teeth with CTS. Dental practitioners should be aware that direct resin composite can successfully be used to treat teeth with CTS.

An Investigation into the Accuracy of Two Currently Available Dental Impression Materials in the Construction of Cobalt-Chromium Frameworks for Removable Partial Dentures

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Removable partial prostheses are commonly constructed today to compensate for the effects of tooth loss, which include compromised appearance, speech and mastication. Irrespective of declining levels of partial edentulousness (Adult Dental Health Survey 1998), the era of removable partial prostheses does not seem to be drawing to an end.

Irreversible hydrocolloid materials enjoy considerable use as impression materials for the provision of master casts and subsequent cobalt chromium framework construction. However, contemporary wisdom recommends the use of addition-cured polyvinylsiloxane. There is sparse literature to support or reject the use of irreversible hydrocolloid as an impression material for cobalt chromium framework construction.

This research investigated the potential suitability of irreversible hydrocolloid as an impression material for cobalt chromium framework construction. This was performed by recording five impressions, in customised trays, using alginate, and five impressions using addition-cured polyvinylsiloxane, of a silver-plated cast, which represented an individual with a Kennedy Class II Modification I scenario. The resultant ten casts, and the silver-plated master cast, were profiled using a contact co-ordinate measuring machine, yielding ten highly accurate and reproducible digitised topographical scans. These digitised scans were superposed to quantify the differences between surfaces between the different casts in all combinations. Within the limitations of this study, this data highlighted the variability of reproduction of alginate and silicone as impression materials, as well as quantification of the differences between surfaces between casts derived from each impression material.

The investigation revealed that digitised scans of casts obtained from alginate and addition-cured polyvinylsiloxane impression materials, when superposed, exhibited a high degree of coincidence. However, certain features, such as undercut areas, resulted in a lower degree of coincidence of scans.

In light of these findings, irreversible hydrocolloid appears to be a viable alternative to addition-cured polyvinylsiloxane as an impression material for cobalt chromium framework construction.

An alternative method of speech bulb fabrication

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Soft palate defects resulting from surgical intervention can have significant functional, psychological and social implications for patients. They can also present as considerable challenges for surgeons to reconstruct. Obturators are used to improve mastication, speech, and swallowing through restoring the separation of the oral and nasal cavities. The conventional method of constructing a soft palate obturator involves fabricating the definitive denture prosthesis upon which a retentive loop is added. It would extend into the soft palate defect. A functional impression of the soft palate defect can then be recorded and the impression material would then be converted to acrylic resin. This case describes an alternative technique in which the functional impression of the soft palate defect in an edentulous patient is taken earlier in the process. An acrylic base plate with a retentive loop is constructed on the master cast. A functional impression of the palatal defect is then taken and the definitive heat-cured denture base and speech bulb is fabricated. The jaw registration and try in stages can be completed on the denture base. The definitive acrylic teeth can then be processed onto it. The advantage of the method described is that the speech bulb component of the obturator can be evaluated at a very early stage of the process and the occlusal registration can be recorded on a stable, rigid cured base plate.

Combined periodontal and prosthodontic management of Peri- Implant Disease: a case report

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Peri-implant diseases involve inflammatory lesions in the tissues adjacent to osseointegrated dental implants and are the result of the host response to bacterial biofilms. Peri-implant mucositis describes reversible inflammation limited to the soft tissues surrounding an implant where as peri-implantitis affects both the soft tissues and bone and can ultimately lead to loss of the implant. Management of peri-implant mucositis is centred on the removal of plaque and calculus deposits and effective maintenance of oral hygiene.

A number of different strategies for the management of peri-implantitis have been proposed which include various antimicrobial treatment regimes combined with both non-surgical and surgical debridement, sometimes with the addition of resective or regenerative techniques. The efficacy of these has been the subject of a Cochrane review, however it was concluded that there was too little evidence to suggest which intervention was most effective. This poster details the management of a patient who presented with peri-implantitis in the upper anterior region. The implants had been placed many years earlier into grafted bone and restored with fixed restorations. Non-surgical and surgical treatments were provided which resolved gingival inflammation and the other clinical signs of infection. However, due to altered gingival architecture in the area the aesthetic result was sub-optimal. This was successfully addressed by the use of a removable acrylic gingival veneer.

This case demonstrates some of the challenges that treatment of peri-implantitis can present, particularly when it occurs in the aesthetic zone.

Prosthodontic clinical audit in a primary care educational environment

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Clinical audit lies at the centre of clinical governance. At the University of Portsmouth Dental Academy (UPDA), we teach our final year students not only enhanced clinical skills but also the fundamental elements of clinical governance. Final year KCLDI students attend UPDA for four clinical days per month for 10 months as preparation for primary care. The total input into their dental programme is less than 3% of educational time. We therefore invite students to devise self-directed clinical audits if they wish to engage with this micro-educational opportunity and staff act as mentors. In two years eleven audits and two repeat audits have been completed. Two audits are presented as exemplars of the students' "audits in action". "Efficiency of denture provision" and "Crown and bridge laboratory work". The removable prosthodontic audit revealed that the majority of audit standards established were met; 100% of denture discharges supervised by clinical staff, 0% need for denture remake and 100% of dentures delivered to patients. 90% of dentures were constructed in fewer than 8 appointments and 97% of dentures had two or less reviews. The audit of the laboratory work from a commercial laboratory revealed that 9% of work had to be returned. Of that 26% was recorded as deficient margins and 13% was due to impression errors. 15% were recorded as poor fit. Overall the majority were due to clinical errors. Clinical audit is presented to the students in a dynamic self-determining manner encouraging participation, rather than coercion, thus providing our junior colleagues a powerful opportunity to realise the excitement and patient benefit of well-planned and executed clinical audit in primary care.

Bulk-fill flowable composite base materials; where is the evidence? A systematic literature review investigating the validity of manufactures' claims

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Dentsply reports 25 million applications of its SDR material since 2009. Competitors now exist, including Venus Bulk-Fill, Filtek Bulk-Fill Flowable and X-tra base. Manufacturers highlight features including; reduced polymerisation shrinkage stress, reduction in internal and marginal voids, depth of cure up to 4mm, optimum degree of conversion and reduction in cuspal deflection and microleakage.

We aimed to assess the quality and level of evidence available to support manufactures' claims for bulk-fill flowable composites in relation to depth of cure and microleakage.

In January 2015, an electronic search of MEDLINE and EMBASE databases was undertaken, via Ovid SP, using the broad search term "bulk fill". In addition, an electronic search of the SCIENCEDIRECT database was completed using the term "bulk fill flowable composite". The resulting abstracts were hand checked for subject matter and full text articles were obtained for those relating to "depth of cure" and "microleakage". Following critical appraisal of the full text articles, data extraction was performed and the results tabulated where possible. The database searches found 190 articles via MEDLINE and EMBASE and 304 articles via SCIENCEDIRECT. 36 articles were found to meet the inclusion criteria. These papers were then critically appraised. The results supporting and contradicting manufactures' claims are summarised using tables and graphs. There is great diversity in both the quality and outcomes of the predominantly laboratory based studies. There is evidence to both support and question manufactures' claims regarding both the depth of cure and microleakage.

Evaluation of Experimental Coating to Improve the Zirconia-Veneering Ceramic Bond Strength

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Technical complications for core-veneered zirconia restorations have been a major reason for failure of the restorations. One of the most common complications is the chipping of veneering ceramic or delamination of the veneer from its core. The incidence of chipping has been reported to be between 15 to 25%. The purpose of the study was to evaluate the shear bond strength (SBS) between zirconia and veneering ceramic following different surface treatments of zirconia. The efficacy of an experimental zirconia coating to improve the bond strength was also evaluated. Zirconia strips were fabricated and were divided into four groups as per their surface treatment: polished (control), airborne-particle abrasion, laser irradiation, and application of the experimental coating. The surface roughness and the residual monoclinic content were evaluated before and after the respective surface treatments. A scanning electron microscope (SEM) analysis of the experimental surfaces was performed. All specimens were subjected to shear force in a universal testing machine. The SBS values were analysed with one-way ANOVA followed by group-wise comparisons. The fractured specimens were examined to observe the failure mode. The SBS (29.17 MPa) and roughness values (0.80) of the experimental coating group were highest among the groups. The residual monoclinic content was minimal (0.32) when compared to remaining test groups. SEM analysis revealed a homogenous surface well adhered to an undamaged zirconia base. The other test groups showed destruction of the zirconia surface. The analysis of failure following bond strength testing showed entirely cohesive failures in the veneering ceramic in all study groups. The experimental zirconia surface coating is a simple technique to increase the micro roughness of the zirconia surface, and thereby improve the SBS to the veneering ceramic. It results in the least monoclinic content and produces no structural damage to the zirconia substructure.

Dental management of Head and Neck Cancer patients in Northern Ireland: a retrospective analysis

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Head and neck cancer principally affects the oral cavity, nasal cavity, sinuses, salivary glands, pharynx and larynx. Approximately 8,800 people are diagnosed with such a malignancy in England and Wales every year. The aim of this retrospective analysis was to determine the oral health outcomes and standard of care provided for 96 head and neck oncology patients referred for pre-treatment dental assessment to the Centre for Dentistry, Queens University, Belfast between June 2013 and November 2014. Comparison was made with published guidelines and a review of the relevant literature. Standards were set using guidelines from the Royal College of Surgeons of England, the National Institute for Clinical Excellence, and the British Association of Head and Neck Oncologists. Information on the patient's planned oncology treatment, dental assessment, and dental treatment plan, was determined from their dental notes and their electronic care record. Only 3 patients were assessed within the recommended 7 days post-diagnosis. In terms of dental pathology, 43% were diagnosed with caries, 46% periodontal disease, 10% periapical pathology, and 7% showed evidence of toothwear. Ten patients were edentulous. Ninety-one (95%) had planned radiotherapy with 39 (43%) of these patients requiring at least one extraction. Extractions completed within the Centre were carried out on average 11 days prior to the start of radiotherapy. Eight had extractions within the high-osteoradionecrosis-risk 10-day interval period pre-radiotherapy, whilst 14 had extractions post-radiotherapy. Forty-one (43%) were awaiting or had had surgery within the oral cavity. 72% of patients were registered with a GDP.

Given the high prevalence of pre-existing oral disease amongst head and neck cancer patients, prompt dental assessment and treatment intervention is vital. Efforts aimed at improving the care pathway are on-going within the Restorative Department through the implementation of a mandatory referral pro-forma and a dedicated assessment clinic.

The topography of polyamide denture base material

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The aim of the study was to investigate roughness and surface topography of a polyamide denture base material (Valplast®) compared to conventional polymethyl methacrylate (PMMA).

A polyvinyl silicone mould (Duplicating material Pourable Silicone® Chaperlin & Jacobs, Sutton, UK) was used to fabricate the wax patterns for the specimens. Two groups of ten specimens were constructed: Group D was compression-moulded heat-polymerised PMMA Diamond D® (Keystone Industries, NJ, USA) and Group V was injection-moulded heat-polymerised polyamide Valplast® (Valplast Int. Corp., NY, USA). Specimens from each group were randomly divided into 5 subgroups according to surface treatment; untouched surface (control), pumiced, polished, machined, and chairside polished group. Surface topography and roughness (Sa, Ra) of polyamide (Valpast®) specimens were measured using white-light confocal profilometry against a control (PMMA) after various surface treatments. Scanning Electron Microscopy investigations were undertaken to assess the topography of the surfaces. Numerical data was handled using non parametric tests.

The roughness measurements (Ra, Sa) showed statistically significant differences in the surfaces investigated and the SEM study showed a surface that is a unique and unusual surface in dentistry. The surface treatment of Valplast® was smoothest as a polished surface, while machining and chairside adjustments increased surface roughness significantly. Machining and chairside adjustments increased surface roughness of Valplast® significantly. The Clinical relevance of the results demonstrates the difficulty of obtaining a smooth surface of polyamide denture base materials after adjustments, even after polishing with recommended chairside adjustment kits.

An investigation into the effect of finishing and polishing protocols on the surface roughness and characteristics of two different ceramic systems

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The recent introduction of monolithic full-contour all-ceramic restorations raises the question of grinding damage elimination, following intra-oral adjustment of the restorations via the processes of finishing and polishing. This is particularly applicable to zirconia-based restorations (due to the difficulty of polishing zirconia) and the recently introduced novel resin matrix ceramic composite material, due to the limited amount of research and literature based on this subject. Ultimately, the appropriate surface finishing protocol for different types of ceramic systems is relatively unknown.

The aim of this in vitro study was to investigate the effect of various finishing and polishing protocols on the surface roughness and characteristics of a commercially available CAD/CAM yttrium oxide stabilized zirconia material (Ivoclar Vivadent IPS e.max ZirCAD) and a novel commercially available CAD/CAM resin matrix ceramic composite material (VITA Zahnfabrik Enamic).

Thirty-two specimen plates of each material were fabricated. These plates were divided into four equal groups containing 8 specimen plates each. The first group acted as a control and contained unadjusted/untouched plates. Plates in the remaining three groups were ground in order to simulate intraoral adjustment and subsequently polished using graded diamond burs, graded aluminium oxide coated polyester discs and diamond impregnated silicone points (with diamond polishing paste) respectively. Non-contact optical profilometry was used to obtain mean surface roughness values (Ra) and SEM was used to qualitatively analyse the specimens' surface characteristics.

All three of the polishing techniques tested created an increase in mean surface roughness relative to the material's control group, which was statistically significant using ANOVA and *post hoc* Tukey testing (p=0.05). Diamond bur polishing resulted in the highest mean surface roughness, followed by silicone point polishing and finally aluminium oxide disc polishing.

It is recommended that graded grit aluminum oxide coated polyester discs be used sequentially for polishing of these restorative ceramic materials. However the surface roughness created by such polishing discs is still statistically significant when compared to an unadjusted/untouched surface. Ultimately, the ideal surface is one that is left untouched or unadjusted.

A displaceable maxillary alveolar ridge - fibrous replacement or gingival overgrowth?

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We document a case report of a 73-year old female, who presented with a poorly retained maxillary denture and failing dentition in the mandibular arch. The focus of the poster concerns the resolution of displaceable tissue on the edentulous maxillary alveolus, initially diagnosed as a fibrous replacement ridge (FRR). Furthermore, the poster will review relevant literature and consider how this finding may impact upon assessment and treatment of patients presenting with displaceable tissue in edentulous regions, whom are typically diagnosed with FRR.

Initial examination of the soft tissues identified a displaceable maxillary alveolar ridge and drug-induced gingival overgrowth of the anterior mandibular dentate region. During construction of the complete maxillary prosthesis various techniques were utilised to address the displaceable ridge. However, following a change to her anti-hypertensive drug regime (cessation of Amlodipine) resolution of the displaceable tissue in the edentulous maxilla was observed, suggesting a drug-related pathophysiology not characteristic of FRR.

There remains a dearth of research regarding drug-induced gingival overgrowth affecting edentulous regions. A literature review identified animal studies and case reports detailing this phenomenon and questioning the role of teeth/PDL in gingival overgrowth. However, no previous research considers the completely edentu-

lous arch and none consider possible resemblance to FRR. Many studies investigate drug-induced gingival overgrowth in periodontics but those in prosthodontics are lacking. This is therefore an interesting area for further research in this field.

Whilst research on the presence of FRR is well evidenced, it remains possible that an edentulous alveolar ridge may display gingival overgrowth, possibly mimicking a mild-moderate FRR. Indeed, it may be beneficial to consider this in patients prescribed drugs which may induce gingival overgrowth. It may also be prudent to further investigate drug-induced gingival overgrowth as a possible mechanism for the presentation of some displaceable ridges in edentulous regions.

Audit of Dental Assessments in Head and Neck Oncology Patients at the Royal Preston Hospital

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Oral cancer has a global incidence of approximately 400,000 cases annually and survival rate of 60%. The pathway from diagnosis to treatment requires a multidisciplinary approach. Restorative dentistry plays a pivotal role in pretreatment dental assessment (DA) and rehabilitation. The following information was ascertained for head and neck oncology patients:

Period from referral for DA to the initial restorative consultation

Number of patients requiring extractions prior to surgery +/- chemo-radiotherapy

Period from referral for extractions to the procedure.

Patients included were referred from Maxillofacial Surgery, ENT and Oncology between October- mid December 2013. Data was obtained from SCR, the oncology department and clinic lists. Statistical software was used for analysis.

A total of 32 patients were included. Of these, DA was carried out in 22% patients pre-surgery, 59% patients post-surgery prior to radiotherapy and 19% patients prior to radiotherapy where surgery was not indicated. Patients were seen for a DA in Restorative Dentistry within an average of 7.6 days (range 0-18) and of these 28 (87.5%) required extractions. 61% patients had extractions under local anaesthesia and 32% under general anaesthesia at the Royal Preston Hospital. 7% patients had extractions at their referring hospital.

Pre-treatment dental assessment was carried out, on average in a week's time. In addition, 100% of patients were provided preventive advice as recommended by BAHNO. Importance of timely DA, extractions and preventing delay in definitive treatment was highlighted. The audit helped in streamlining the service further. Protected extraction appointment slots were facilitated. A timed pathway is now complete and currently in use at the RPH.

Management of Diminutive Upper Lateral Incisors using Indirect and Direct Composite Resin

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Hypodontia is the developmental absence of one or more teeth affecting the primary and/or permanent dentition. In the UK it is estimated to have a prevalence rate of 4-4.5% and a higher predominance in females. It is associated with microdontia, which commonly affects the upper lateral incisors that tend to have ovate tapered crowns. This clinical presentation has restorative implications concerning aesthetics, which can have unforeseen psychological impact on the patient. We aimed to demonstrate and compare the use of direct and indirect composite resin as a suitable first-line treatment option in hypodontia teeth. We used a case series of patients with diminutive upper lateral incisors treated at Guy's Hospital using direct or indirect composite resin techniques. Current treatment options for diminutive upper lateral incisors include direct or indirect composite resin, porcelain veneers, porcelain-bonded to metal or all-ceramic crowns. Decisions regarding the most appropriate option are dependent on a variety of interrelating factors such as age, tooth size, angulation, space and crown height. Porcelain veneers may be inappropriate in young patients as the gingival margin is not fully mature, meaning over time the restoration margin can become exposed and unsightly, and cannot be added to. Composite resin

offers a conservative approach and predictability in achieving optimum aesthetics. There are no known long-term trials of success using composite resin to restore diminutive teeth. However, composite resin has shown to have a median survival time short of 6 years when placed in localised anterior toothwear cases.3 Indirect composite resin can be used as an alternative to the direct technique offering the advantage of clinical time efficiency, establishing a better emergence profile and can be undertaken with minimal or no preparation, therefore maintaining maximum surface area of enamel for adhesive bonding.

Reconstruction of a Maxillectomy Defect with a Free Iliac Crest Bone Graft

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Maxillary defects are traditionally reconstructed with prosthetic obturators or free tissue transfer techniques. Malignant lesions often require post-operative radiotherapy, potentially limiting reconstructive options. However, a maxillectomy undertaken in the management of benign tumours may enable a wider spectrum of reconstructive potential. Here, we present a case of maxillary defect restoration using a free iliac crest bone graft and implant placement.

A 36-year-old female presented with an odontogenic myxoma in the right maxilla in 2006. This benign tumour was treated with a maxillectomy. Palatal and alveolar mucosa was preserved and soft tissue closure of the oro-antral communication took place. A chrome cobalt denture restored initial function and aesthetics, but the patient preferred a long-term, fixed, restorative solution. Following full consideration of all available options, a decision was made to undertake a free iliac crest graft placed between the pterygoid plates and upper canine region. To ensure procedural accuracy, bone was harvested using a stent created from a 3D model. The graft, secured with two screws, was placed in a soft tissue envelope between the mucosa and scar tissue that had formed. After three months, a standard first stage implant was placed and excellent primary stability was achieved. Implant restoration took place successfully. There was no evidence of odontogenic myxoma recurrence. Controversy exists regarding the use of vascularised versus non-vascularised bone grafts for bony defect reconstruction. Vascularised flaps have good survival rates, but increased risk of morbidity. Free bone grafts may reduce these risks, benefitting defects where radiotherapy is not required. Maxillary defects do not generally lend themselves to free grafting. In selected cases, however, a second procedure involving a simple bone graft in a soft tissue envelope may be considered prior to restorative rehabilitation.

A survey to compare the use of intra-radicular posts amongst dental practitioners

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Restoring a root filled tooth with limited coronal tooth tissue is challenging. Dentists are presented with a wide variety of intra radicular posts and materials to choose from. These include both metal and non-metal based posts systems in both cast and prefabricated forms. The indications for placing a post are well known, as are the factors affecting their survival. However, it is not clear what posts dentists choose to use and when to restore teeth and the rationale behind their selections. This study used a survey distributed between two different target populations to find any differences in the use of intra-radicular posts.

There were no statistically significant differences between the two groups, in selecting intra radicular posts according to particular clinical scenarios or the types of post systems used in their own clinical practice. It was found that non clinical factors, such as the year of qualification of the dentist and post graduate qualifications was shown to influence the choice of intra radicular post systems. It can be concluded that whilst there is no significant difference between the two groups of dentists with regard to their use and selection of intra radicular post systems, there is a greater effect than previously thought by non-clinical factors on the use and selection of post systems.