Code EP1

A Service Evaluation On Tooth Restorability

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Background:

Many foundation dentists are faced with the daily challenge of uncertainty around the restorability of challenging cases, where the question of restorability is not clear cut. This is often compounded by varying opinions between general practitioners and undergraduate teaching.

Aims:

To assess the restorability of teeth with questionable prognosis with the aim of identifying potential variations in opinion and treatment planning between dentists of different experience and skill level. It is hoped that this will facilitate foundation dentists decision making and treatment planning in challenging cases.

Objectives:

1. Highlight the difference of opinion between dentists of varying experience and skill levels
2. Make Foundation Dentists aware of the clinical parameters and challenges associated with restoring teeth of questionable prognosis
3. Explore different treatment options that arise from the teeth in the sample and those collected from the questionnaire.

Methodology:

Clinical features and parameters of 60 teeth examined across three general practices which had questionable prognosis, were documented by three Foundation Dentists using a data capture form together with intraoral photographs and radiographs.

A piloted questionnaire was developed and distributed to clinicians of varying clinical experience and qualifications, from both secondary and primary care background to ascertain the plethora of treatment options and opinions on tooth restorability.

Results:

The results indicated a clear variation in opinion between practitioners with years of experience and postgraduate qualifications being the key differentiators in opinion.

Code EP2

An Audit Investigating The Appropriate Management Of Diabetic Patients In General Practice, In Relation To Periodontal Health

Amrit Kaur Chaggar, Rana Wali, Sophina Mahmood, Yasamin Hamrang-Yousefi (NE London Deanery)
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Introduction:

Research has found a close relationship between the disease progression of diabetes and periodontitis. It is estimated that 1 in 3 diabetics suffer from periodontitis at some stage of their disease. Diabetes has since been recognised as one of the main risk factors for periodontal disease, with poor control contributing to the bodies reduced wound healing capacity. To monitor the diabetic control, the HbA1c (glycated haemoglobin) value is the most accurate indicator. This can be used in conjunction with communication with the patient's general practitioner, with requests of the recent test results to understand the diabetes risk to the periodontal health for that individual.

Aims:

The aim of this audit is to determine the compliance of general dental practitioners with the recommendations in the De-

livering Better Oral Health toolkit (2014). It will be used to determine whether we are assessing the risk of diabetes and its control to dental diseases and the notifying patients of the risk of poor control, including transient phases.

Method:

A retrospective audit was performed on patients being seen in 4 general dental practices in the North East London area. The patients had attended the practices within the period June 2014- September 2016, with diabetes noted in their medical history forms. A pro-forma was created to record whether the control of diabetes was noted and in what form, and whether the risks were explained to the patients. For those patients with questionable control/clinical signs of disease, a record of whether any contact with the general medical practitioners had occurred was noted.

Results:

A total of 175 patients were included. The diabetes control was only recorded in the notes of 20% of all patients, with only 1% with recorded Hb1Ac values. It was noted that in only 5% of clinical records were the dental risks related to diabetes explained. In those patients with poor diabetic control or not responding to periodontal treatment, only 1% of those general medical practitioners were contacted for more information.

Discussion:

The results of this audit reveal that patients are not being screened appropriately during their consultation appointments for risk of dental diseases as a result of their diabetes control. Many changes have been implemented in accordance to the Delivery Better Oral Health Toolkit to ensure those patients with diabetics are managed correctly. An additional medical history pro-forma has been added for those with diabetes to gain more information about their control. A general medical practitioner letter template has been created for use in the four dental practices. The final change includes the production and distribution of a leaflet relating diabetes to dental care to those patients affected. The audit will be repeated in 3 months' time.

Code EP3

Occlusal Registration Audit

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Background:

Carrying out occlusal registrations is integral during construction of complete or partial dentures. The British Society of Prosthodontics (1996) guidelines state a occlusal registration stage must be carried out when providing any form of dentures for patients. This stage allows dentists to accurately record occlusal vertical dimensions, remove occlusal interferences, and enable final dentures to ensure optimum function, comfort, aesthetics and satisfaction.

Aims:

This audit aims to establish whether:

1. Occlusal registrations were carried out routinely for dentures
2. If so, which methods did dentists use to record registrations
3. If occlusal registrations were not completed, did this impact on the number of denture alterations post fit
4. To gauge dental technicians preferred method of occlusal registration

Methodology:

A data collection sheet was piloted across four NHS practices in North-East London, reviewing 40 dentures constructed by sixteen dentists, over the past six months. Following amendments to the pilot, a random sample of 106 dentures made by the same dentists and practices were evaluated retrospectively, via clinical records using the standardised collection sheet. Clinical records of patients who had received any form of a denture were analysed as part of this audit. Following poor compliance from dental technicians completing feedback questionnaires regarding occlusal registrations, short telephone interviews were conducted to establish five dental laboratories technicians opinions regarding the occlusal registrations recieved from dentists.

Results:

For the 106 dentures audited, comprising of 99 acrylic and 7 cobalt-chrome dentures, results showed that for 29% of them, an occlusal registration was not completed; though majority of these cases involved smaller dentures replacing up to 6 teeth. For the remaining 71% dentures, in which an occlusal registration was completed, wax blocks was the preferred material. Of the 75 dentures for which an occlusal registration was completed, 77% did not need any denture adjustment appointments after final denture fit, and only one denture needed two or more appointments. Whereas, of the 31 dentures for which an occlusal registration was not completed, 84% needed denture adjustment appointments after final denture fit, of which 55% needed two or more appointments.

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Results of the telephone interviews showed that dental laboratory technicians preferred a squash-bite wax record block, as opposed to notches and blu-mousse intra-occlusal records, with centre and canine lines clearly marked and cast models being tied with elastic bands.

Conclusion:

To conclude, result showed that occlusal registrations were not always routinely carried out for patients, especially for relatively small dentures replacing upto 6 teeth. Providing laboratories with an occlusal registration allowed fabrication of dentures with a resultant reduction in the number of denture adjustment appointments. Having contacted the five dental laboratories used, consensus on the preferred method for occlusal registration was a squash-bite wax record.

Code EP4

An Audit Of Pediatric Record Keeping In A Four General Dental Practices

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Introduction:

The SDCEP, FGDP, DBOH Toolkit and BSPD guidelines state the importance of thorough paediatric assessment and record keeping. This facilitates lifelong dental health and development if issues are identified at a young age and prevention is appropriately carried out.

Aims/Objectives:

This project focussed on patients within the age range of 7-14 treated in primary care and aimed to establish whether 1) modified BPE assessments are carried out and corresponding treatment implemented 2) risk assessments are recorded and the appropriate preventative measures undertaken 3) occlusal factors examined and if any abnormities are noted are they managed and 4) are timely and appropriate referrals made as well as justifiable radiographs taken at the correct intervals.

Method:

A total of 85 sets of NHS clinical records from 4 different practice and 15 clinicians were evaluated at random over a period of 5 consecutive days taken from September to December 2016. The data was collected retrospectively using a standardized data collection sheet.

Results:

The results indicated that only 16% of records included a modified BPE score, the documentation of risk assessments was generally poor, including only 48% stating caries risk, details of advice given was poorly recorded and preventative measure were not routinely carried out. Radiographs were only taken in 25% of patients, with only 36% of patients having had them in the past. Despite a high incidence of oral hygiene and diet advice (87% and 79% respectively), the details of such advice were generally poorly recorded. Topical sodium fluoride was applied in 74% of cases.

Conclusions:

Overall it was identified that GDP's were not routinely carrying out thorough examinations of paediatric patients. Compliance with paediatric guidelines were low. In order to increase compliance and awareness amongst the practitioners practice meetings were held and a toolkit developed and implemented. A second round of data collection showed a significant improvement.

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Code EP5

An Audit Of Success Rate Of Temporary Crowns Based On Fabrication And Its Impact On Definitive Crown Fit Stage

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Temporary crowns (TC) are essential for protection of pulpal and periodontal health, marginal adaptation, space maintenance and aesthetics. The aim of this audit was to ascertain whether the following criteria have an impact on the success of TC:

- Type of material used (Acrylic Vs Resin)
- Method of fabrication (Putty Vs Freehand)
- Time interval between placement of temporary and definitive crown
- Assess the impact of failure of TC on subsequent definitive crown fit stage.

Method:

Retrospective data from 80 patients across four NHS dental surgeries in North East London were collected. Failure recorded was based on the British Society for Restorative Dentistry guidelines. Temp bond (Kerr) was used for cementation in all cases.

Results:

From the 80 TC placed, 53 were acrylic and 27 resin. Overall 11 (13.8%) failures were recorded, all due to loss of marginal integrity. 5 of the 53 (9.4%) of the acrylic failed and all of these were fabricated freehand. 6 of the 27 (22 %) resin failed, with 2 fabricated freehand and 4 with putty. Majority of failures occurred within the 1-2 weeks. 7 out of 11 failed TC (64%) required adjustment to the definitive crown. In comparison, 27 of the 69 successful TC required (39%) crown adjustment. No correlation was noted between tooth preparation adjustment and TC failure.

Concluding Remarks:

- Failure rate of acrylic is significantly less than resin
- All the acrylic failures were fabricated free hand
- Most failure occurred in within 1-2 weeks
- TC failure had a significant impact on subsequent adjustment to the definitive crown

There is a need for second stage cycle of audit, with prospective data collection.

Table 1.

Material	Method	Success	Failure	Grand Total
Acrylic	Freehand	32	5	37
	Putty	16		16
Acrylic Total		48	5	53
Resin	Freehand	16	2	18
	Putty	5	4	9
Resin Total		21	6	27
Grand Total		69	11	80

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Code EP6

An Audit on Oral Health Risk Assessment in General Dental Practice

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Background:

The National Institute of Health and Clinical Excellence guidelines (NICE, 2004) published in relation to routine dental recall intervals advises determination of oral health risk assessments for individual patients. Carrying out a risk assessment for the four domains: caries, periodontal disease, tooth surface loss and oral cancer can help clinicians make tailored decisions regarding management of individual patients, while discussing the scores with patients can aid in educating patients about their own oral health. Recording risk assessments in clinical records has been recommended as good practice (SDCEP, 2012; FGDP, 2009). However, working in general practice has identified inadequacies in clinical record keeping with regards to oral health risk assessments.

Aims:

This audit aims to establish whether:

a risk assessment of the four domains was routinely carried out and recorded in clinical records the patients had an understanding about their own assessment scores

Methodology:

A retrospective audit was completed across two general dental practices in North East London. A random sample of 100 clinical records were analysed, using a piloted standard data collection form, to determine if caries, periodontal disease, tooth surface loss and oral cancer risk assessments were recorded in the notes. This was followed by patient questionnaires to determine whether they were made aware of their respective risk assessment scores.

Results:

It was noted that a risk assessment was not recorded in 54% of the clinical records. Of the clinical records that had a risk assessment recorded, 84.8% had recorded oral cancer risk while only 65.2% had recorded tooth surface loss risk. Yet, caries and periodontal disease risks were recorded in 97.8% and 95.7% of the 46 clinical notes, respectively. The patient's understanding was then evaluated, of the 100 patients, only 22% were aware of their allocated risk assessment status, whereas 60% were oblivious to this, while the remaining 18% did not respond.

Conclusion:

The results of this audit across the two primary care practices showed that despite published evidence and guidelines, there were inadequacies in clinical record keeping with regards to documentation of oral disease risk assessments. It was determined that changes needed to be implemented across the practices to achieve a higher standard of patient care. An evidence-based risk assessment index has been formulated to help clinicians determine and record patient's oral health risk assessment status. A second audit cycle will be conducted after implementing this change to assess its effectiveness in increasing patient awareness, enhancing patient education and improving clinical record keeping.

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Code EP7

A Service Evaluation Investigating The Use Of Tooth Wear Risk Assessment And The Use Of Screening Tools In General Dental Practice

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Aims & Objectives:

To identify the differences in risk assessment, charting and treatment planning of erosive tooth wear in general practice with secondary analysis investigating risk assessment between dentists of different experience levels.

Methods and materials:

A proforma to investigate tooth wear screening and risk assessment was devised and piloted on 20 new patient assessments to check legibility and validity. New patient oral health assessments by foundation dentists, associate dentists and foundation trainers in three different general dental practices located within North East London were audited. The clinical records of dentate patients (minimum of 20 teeth present – 10 teeth per arch), aged 16 or over, attending for oral health assessments between the 1st October 2016 and 31st December 2016 were audited. Clinical notes were examined for evidence of tooth wear charting, use of the Basic Erosive Wear Examination (BEWE), and risk assessment of temporomandibular dysfunction (TMD), soft tissue signs of parafunction and intrinsic/extrinsic sources of acid. Descriptive statistics and chi squared tests will be used to assess differences between groups.

Results:

255 clinical records have been audited. Descriptive statistics are presented in this interim analysis. 41 records (16.1%) evaluated had a diagnosis of erosive tooth wear recorded. It was found that 26 records (10.2%) had recorded a BEWE. Only 1 clinical record (1.1%) written by associates contained a BEWE, with no foundation trainer using the BEWE (0 from 78). No other screening tools were used. 54 foundation dentist records (64.3%) demonstrated a risk assessment including TMD, soft tissue signs of parafunction and intrinsic/extrinsic sources of acid being assessed. In contrast, only 9 associate records (9.7%) and 6 foundation trainer records (7.7%) demonstrated a risk assessment based on factors listed. The majority of assessments and use of screening tools for erosive tooth wear were performed by foundation dentists. A further 30 records have yet to be audited.

Conclusion:

This audit has highlighted erosive tooth wear screening using the BEWE and a comprehensive risk assessment is not routinely performed in audited dental practices. There appears to be a trend that foundation dentists are more likely to perform risk assessments but an increase in sample size and statistical analysis is required to confirm this. Overall, record keeping for erosive tooth wear and management is poor among all three cohorts of dentists. This indicates that it would be beneficial for dentists to use a screening tool as part of their examinations and may benefit from being provided with guidelines or a toolkit on risk assessment of erosive tooth wear.

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Code EP8

A Clinical Audit Into Dental Hygiene Instruction Provided In Primary Dental Care

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Background:

Effective dental hygiene is a vital component to oral health and for the prevention of an array of dental disease. A lack of knowledge in denture hygiene by users of removable prosthetic devices has been shown from previous studies. All patients with removable prosthetic devices should have effective and thorough denture hygiene instructions, as well as repeated at regular recall intervals to reduce any deficiencies in knowledge.

Aim:

To evaluate the quality of denture hygiene instruction delivered in general dental practice.

Methodology:

The study was completed as an audit within a range of dental foundation training practices within London. Data was collected retrospectively to determine the standard of denture hygiene instruction delivered through verbal methods only (n=100). Unfortunately evidence-based guidelines in the UK pertaining to denture hygiene advice do not exist. Criteria selected from evidence-based studies and guidelines published by the American College of Prosthodontists were used, with a standard set to 100%.

Conclusion:

The majority of patients were found to have knowledge lacking in appropriate and successful denture hygiene. The standard set was not achieved. To improve denture hygiene advice delivered, a graphic written leaflet and series of videos were produced and offered to patients to aid understanding of information given. On second audit cycle, a pilot was completed showing patients knowledge to maintaining good denture hygiene had vastly improved. Providing an effective and positive solution to improving denture hygiene education in the future.

Code EP9

A Clinical Audit To Assess Periodontal Record Keeping Standards, In Line With The Latest Guidelines, Carried Out In Four General Dental Practices In North East London

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Background:

Periodontitis is the most common chronic inflammatory disease affecting nearly 50 % adults in the United Kingdom. It is a major public health problem, causing tooth loss, disability, masticatory dysfunction and poor nutritional status. Periodontitis also 'compromises speech, reduces quality of life, and is an escalating burden to the healthcare economy.'[1] Undiagnosed and untreated periodontal disease is one of the fastest expanding areas of complaints and litigation in dentistry. The DDU reported a total payout of almost £2.8 million in 2014 with relation to medico legal cases involving periodontal disease.[3] A comprehensive and well-documented periodontal assessment is essential for compliance with regulatory and dento-legal standards but more importantly, vital for diagnosis and appropriate treatment planning.

Aims:

This audit aimed to assess and improve the dentists' quality and content of clinical record keeping with regards to examination, diagnosis and treatment of periodontal conditions, in line with The Good Practitioner's Guide to Periodontology[2], within the setting of four general dental practices in North East London.

Methodology:

Retrospective data was collected from 200 new adult dentate patient assessments, seen after the guidelines were updated in 2016. A standardised data-collection pro forma was made and used to record and score the information available in the clinical notes. Our pro forma reflected what we would expect to be recorded in well-documented clinical notes for patients suffering from periodontal disease. After the initial round of data collection, changes were put in place and a prospective audit of 100 patients was carried out.

Results:

Initially only 62% met the standard criteria. After holding practice meetings, new interventions and protocols were introduced to try and improve problem areas that were identified during the first audit cycle and implemented before the second audit cycle. The second audit results demonstrated a marked improvement.

Conclusion:

Areas that were consistently recorded and updated well were: Medical history, social history especially smoking status and BPE scores. Areas where developments needed to be made were in relation to recording: plaque assessment, complete diagnosis, patient discussion/education, appropriate treatment options given and elected including recall time and 6PPC* not being filled out completely. It was also important to remember to record relevant negative findings. The main limitations to improvements were time restraints and communication.

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Abbreviations:

* 6PPC – six point pocket chart

No Awards posters

Code NA1

Medical Grade Polymers as an Alternative RPD Framework to Restore Partially Edentulous Patients

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Introduction:

The number of partially dentate adults is increasing, and many of these patients will require replacement of missing teeth. Removable partial dentures (RPDs) can have advantages over fixed partial dentures and implants, and are widely used in clinical practice. However, a significant need exists for novel materials and manufacturing technologies to decrease undesired features associated with current RPDs. Advanced medical-grade polymers can potentially serve as alternative precision-fit RPD frameworks that can utilize digital workflows. These digital design and manufacturing processes are expected to improve fit, aesthetics, and function while reducing costs and labor. This study was conducted to evaluate patients' satisfaction on numerous features of a polymer frame RPD and to assess overall satisfaction and patient preference between a standard and alternative polymer RPD frame.

Methods:

Patient satisfaction on comfort, speech, aesthetics, function, and preferences were evaluated for 2 Ultaire® arylketone polymer framework RPDs in denture-naïve and -experienced patients. The standard design followed a conventional metal framework design, while the alternative followed a design that optimized the polymer's properties. Patients >18 years old, with ≥3 missing teeth, and stable oral health were enrolled. All patients were blinded and randomized for order of assessment of the 2 RPD designs. Patient satisfaction was measured on a Likert scale (1=very dissatisfied, 5=very satisfied), and frame preference was assessed using a questionnaire on overall preference, aesthetics, comfort, and function.

Results:

A total of 20 patients were enrolled and 3 discontinued. Of patients who reported a 4 or 5 on the Likert, 64.7% and 62.5% of patients reported overall satisfaction with the standard versus alternative RPD design. Patient satisfaction results showed that satisfaction was greater with the alternative design versus the standard for comfort (81.3% vs 76.5%), weight (93.8% vs 82.4%), color (81.3% vs 76.5%), and aesthetics (87.5% vs 58.8%), while patients were more satisfied with the standard design compared with the alternative for speech (88.2% vs 81.3%) and chewing ability (82.4% vs 81.3%). Patient preference results indicated that more patients preferred the alternative frame for comfort and fit. The questionnaire results also indicated that more patients reported an overall preference for the alternative (53.3%) versus standard design (46.7%).

Conclusions:

Data from this patient satisfaction study indicate that the RPD design based on the optimized Ultaire® polymer was preferred over the standard polymer RPD design over a wide range of characteristics and functions. Arylketone polymer-optimized RPD designs are viable alternatives to currently available standard RPD designs and may be preferred by patients across multiple factors.

Code NA2

3d Printed Guided Endodontics and Integration of CBCT To Treat Unusual Anatomy

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An unusual case of fused lower second and third molars presented to the practice. This tooth was also mesially tilted. This tooth was also a strategic tooth and could not be extracted owing to the importance of retaining the tooth for the future prosthetic abutment. Because of the unusual anatomy, a small FOV 5x5 CBCT was taken of the tooth. This showed the difference in the root canal anatomy as well. The patient was extremely nervous and wanted to finish the treatment in one sitting if possible. A decision was made to do 3D guided endodontic therapy which will minimise the loss of tooth structure and guide the angulation of the pilot drill to go straight into the pulp chamber and entry of the canal system. The tooth was electronically dissected out of the CBCT data and 3d printed plus a drill guide was also 3d printed. This enabled safe and effective endodontic therapy.

Code NA3

Innovative Use of an Intraoral Optical Scanner and CBCT Data for One Visit Provision of Immediate Emergency Denture

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A patient presented to the practice on a Friday afternoon with a broken long span bridge.The main abutment had fractured plus the anterior abutment was carious and unrestorable. The patient had a public speaking engagement on the coming Wednesday morning. The intraoral scanner was used to register the bite relation, and the CBCT was used to digitise the vinyl polysiloxane impressions into STL file format. The scan file from the intraoral scanner and the STL file from the CBCT data of the impressions and the shade data taken by the easyshade advance device was emailed to the lab, just before the lab closed on friday. The models were 3d printed at the lab; the denture was fabricated and couriered back on Tuesday morning. The denture was fitted Tuesday evening. It fitted very well and needed minimal adjustments. Patient was very happy

Orals

Code SO1

Patient Information Software For Head And Neck Oncology Patients

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Curative surgery for head and neck cancer can be complex to explain to patients who often have no experience of such surgery. Patients who are newly diagnosed with head and neck cancer are often concerned not only about survival but also about the effect that surgery may have on their quality of life from both appearance and function perspectives.

Explaining the surgery can be difficult and on occasions patients ask to meet others who have been through a similar procedure. Finding suitable post-operative patients can be challenging and time-consuming or in some cases is impossible

It was felt that patient information about the physical outcomes of surgery could be improved by building a portfolio of cases, so that a similar case could be shown to newly diagnosed individuals if required. This collection of cases was developed into a 'catalogue' from photographs of existing patients who were willing to take part.

Consent was taken from the patients and standard photos taken in the medical illustration department. These included full head and neck images to show scarring and asymmetry, views of flap donor sites as well as intra-oral images of flaps in situ. Images were also included of fixed and removable dental prostheses placed post-operatively.

Following the preliminary paper version, it was suggested that an electronic version be made in a similar fashion to a web page, which could be accessed across the region from a secure intranet page. This has the advantages of always being available across sites, having the option of regular additions and amendments and of including video.

The e-version was made using Microsoft PowerPoint and allowed the images to be grouped with hyperlinks allowing simplified navigation between groups of related images. Development of this has also facilitated the inclusion of video footage of consented patients describing their journey and allowing prospective patients to view any alterations to movement and speech in real-time.

It is our aim that multi-disciplinary professionals will be able to guide patients through the relevant images to show them some of the possible physical outcomes of surgery. We hope this will be used regularly as a tool to support and inform patients in the complex consent process for major head and neck cancer surgery.

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Evaluation of Operating Time, Patient Perception and Accuracy of Crowns Based Conventional Impression Technique and Intraoral Scan - A Split-Mouth Randomised Clinical Study

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Objectives:

To compare operating time and patient perception of conventional impression technique and intraoral scanning when manufacturing a tooth-supported crown. Furthermore, to compare the accuracy of marginal and internal fit of tooth-supported posterior crowns based on conventional impressions or intraoral scans.

Materials and Method:

19 patients needing indirect full coverage restorations fitting a split-mouth design were recruited. Each patient received two lithium disilicate crowns; one based on a conventional impression technique (CI) and one based on an intraoral scan (IOS). Both teeth were prepared following the manufacturers recommendations. For both impressions techniques, two retraction cords soaked in 15% ferric sulphate was used for tissue management. CI was taken in a full arch metallic tray using one-step two-viscosity technique with polyvinyl siloxane silicone. IOS was taken with Trios 3 (3shape, Copenhagen, Denmark). The operating time for each step of the two impression methods was registered. The patient perception associated with each method was scored using a 100 mm Visual Analogue Scale (VAS) with 100 as maximum discomfort immediately after impressions had been taken.

Moreover, to replicate the interface between the crown and the preparation, each crown was cemented on its corresponding clinical preparation with ultra-flow silicone. The crowns and the silicone lining were removed and the specimens were stabilized with heavy body silicone. Each specimen was sectioned in four orientations for molar and two orientations for premolars, and internal misfit measured using stereomicroscopy (×40). The marginal and internal gap was determined as the vertical distance from the internal surface of the crown to the prepared tooth surface at five points (preparation margin, internal angle, axial wall, cusp tip and occlusally).

Results:

Median total operating time for CI was 15:47 minutes (IR; 15:18 -17:30) and 5:05 minutes (IR; 4:35 - 5:23) for IOS. Median VAS score for patient perception was 73 (IR; 16 – 89) for CI and 6 (IR; 2 – 9) for IOS. The differences between the two groups were statistically significant ($P < 0.05$) for both parameters.

The distance between the tooth surface and inner surface of the crown were as follows in micrometers (± standard deviation): at the preparation margin 83 (±40) for CI and 72 (±46) for IOS; at the internal angle 129 (±51) for CI and 100 (±44) for IOS; at the mid axial wall 115 (±50) for CI and 95 (± 40); at the cusp tip 170 (±45) for CI and 162 (±55) for IOS; and occlusally 182 (±55) for CI and 156 (±58) for IOS. The difference was statistically significant at all points except at the cusp tip ($p<0.05$).

Conclusions:

IOS compared with CI was less time-consuming and patient perception was in favour of IOS. Furthermore, crowns based on IOS had a better fit at the preparation margin, internal angle, mid-axial wall and occlusally, compared to crowns based on CI. The difference was not statistically significant at the cusp tip.

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Mini Dental Implants (MDIs) - The Answer to McGill? A Pilot Randomised Controlled Trial (RCT)

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Background:

The McGill and York consensus statements unequivocally advocate the use of two implants in anterior mandibles to retain lower complete overdentures as the first line of treatment for edentulous patients. There are many reasons why this is not being implemented, commonly affordability (for both the individual and health services) and perceived pain. MDIs are a simpler alternative to conventional dental implants, but doubts exist as to their efficacy and true cost effectiveness over time. Research into MDIs is sparse and there is very little evidence to support their use as a first line treatment for the edentulous.

Aim:

To carry out an RCT to assess the feasibility of comparing two conventional dental implants versus two MDIs to retain lower complete overdentures.

Methods:

A pilot, single-blinded, two arm, parallel RCT conducted in the University of Manchester Dental Hospital (UK) between 2013 and 2015. Inclusion criteria were medically healthy non-smokers with severely atrophic edentulous mandibular ridges. Patients were centrally randomised (permuted blocks) into either the conventional implant arm (Group 1) or MDI (Group 2) with allocation ratio of 1:1. The primary feasibility outcome measure was recruitment and retention of patients into the trial. Secondary outcome measures included general and oral health-related quality of life (HRQoL), masticatory function, anxiety, pain and direct and indirect costs. All patients received either two conventional implants (4mm x 11mm) or two MDIs (2.1mm x 10mm) placed in a one-staged technique with early loading and subsequent six months follow up. Outcome measures were carried out by a research nurse blind to the allocation.

Results:

A total of 181 patients were screened for the trial, of which 81 were eligible and had new conventional complete dentures made. Forty-six patients were recruited: 24 randomised to Group 1 and 22 Group 2. The median ages per group were 69.3 and 69.7 years respectively. The oldest patient in the study was 89.1 years. No significant difference in HRQoL was observed between the two groups (EQ-5D: -0.08, 95% CI -0.32, 0.15; SF-6D: 0.02, 95% CI -0.12, 0.16). A significantly higher total cost was found for Group 1 (difference +£328.55, 95% CI 137.43, 519.67). No significant difference was found in unscheduled visit costs (-£15.04, 95% CI -87.43, 57.34) despite there being more unscheduled visits related to the MDIs (23 Vs 13). Group 2 experienced less pain and took fewer painkillers. There was one implant failure in Group 2. MDIs were 58% quicker to place than conventional implants. One MDI failed during the follow up period and was replaced successfully. Four patients experienced adverse events (severe pain and infection) and these were confined to Group 1.

Conclusions:

This pilot study identified that HRQoL showed little variation and that the main cost differences occurred during implant placement. Furthermore, that it is possible to recruit and retain older patients for a research study into MDIs, paving the way for a large multicentre trial with long term follow up. It highlights the use of two MDIs as a feasible treatment modality within its limitation of short-term follow up.

Code SO4

Management of Peri-Implantitis: Reporting of Three Cases

Ursala Jogezai, Despoina Chatzistavrianou, Alistair James, Kevin Fairbrother and Karun Dewan (Birmingham Dental Hospital)
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Introduction:

Implant rehabilitation is considered a predictable treatment option with high survival rates for the replacement of single and multiple missing units. However, the risk of soft tissue complications is alarmingly rising in the everyday clinical practice. There is lack of robust evidence regarding the management of peri-implantitis and variations in cases and management approaches make it difficult to adopt a standardised decision-making protocol.

Aim:

The aim of this poster is to present the restorative management of three peri-implantitis cases and share with colleagues different treatment modalities available for this group of patients.

Case description:

1- A 71 year old female presented with pain and recurrent infections due to failing implants at LR6 and LR7 sites that were placed overseas. Clinically, LR6 and LR7 implants had 7 mm and 5 mm pocket depths respectively with bleeding on probing and tenderness to palpation. After initial OHI and non surgical periodontal treatment (NSPT) this case was managed with Surgical periodontal debridement alone.

2- A 22-year old male patient presented with gingival bleeding and soreness around the LL1 fixture. Clinical examination revealed 7-9 mm pocket depths with bleeding on probing around the LL1 fixture. After the initial management with OHI and NSPT, surgical periodontal treatment with Guided bone regeneration (GBR) was provided.

3- A 60 year old lady presented with a failing implant LL6 which was done overseas 23 years ago. Recurrent infections, gingival swelling and a 6 mm pocket and suppuration at the buccal aspect was noted at the LL6 fixture. After the initial with OHI and NSPT, surgical periodontal treatment with GBR and local delivery of antibiotics was provided.

In all three cases, the surgical sites healed well and resolution in pocket depths and bleeding on probing was achieved.

Conclusion:

While there are various treatment modalities available for management of peri-implantitis, the final decision should be based on various factors such as bone levels, availability of keratinised tissues, operator skills, patient preference. Restoratively driven implant placement, prosthesis design and individualised maintenance are key factors to a successful implant rehabilitation that needs to be considered in each case to minimise complications.

Code SO5

Oral Rehabilitation of a Patient With Multiple Failed Maxillary Partial Dentures and Mandibular Toothwear: A Case Report

Sehrish Khalid, Despoina Chatzistavrianou, Mr Kevin Fairbrother (Birmingham Dental Hospital/Birmingham Community HealthCare Trust)
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Introduction:

To restore multiple edentulous spaces, conventionally the most common treatment is the provision of dentures. As the mean survival age is increasing, the number of people requiring dentures will continue to increase. Current literature shows significant improvements in the quality of life in patients with edentulous arches when provided with an implant supported prosthesis compared to conventional dentures.

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Dental implants are conventionally placed vertically within the bone, however not all cases lend themselves to traditional placement. In cases of poor bone quality and minimal bone volume where there is a need for bone grafting; a beneficial technique may be distal tipping of the implants. This tilting can allow longer implants to be placed, thus providing implants in strategic positions for prostheses with great cortical anchorage. Further advantages of tilted implants is preservation of anatomical structures, reduction in cantilever length, and increasing interimplant space.

The concept of tipped implants uses four implants in the edentulous jaw; two in the anterior area axially oriented and two tilted implants in the posterior arch.

Aims:

To present a case showing the provision of a maxillary implant supported bridge utilising the tipped implant concept and management techniques in achieving aesthetic outcomes with unfavourable implant angulation discrepancies.

To highlight the management of tooth wear using minimally invasive techniques

Case:

A 70 year old man presented to the Restorative Department with a partially edentate maxilla and a history of multiple unsuccessful partial dentures, as well as tooth wear in the mandibular dentition. After further unsuccessful attempts at providing a partial onlay denture, the patient sought an implant supported option.

The treatment proposed included extraction of the remaining dentition and placement of dental implants using the tipped implant protocol.

Once the correct occlusal relationship and tooth positioning was established with wax try-ins, a CT scan was utilised to plan the surgical stage of treatment and four maxillary implants were placed.

After a period of healing, the implants were uncovered and a provisional bridge placed. Prior to definitive bridge provision, lower anterior composite build ups were undertaken and the lower premolars were restored with indirect composite onlays.

The UR2 fixture position was unfavourable; angled abutments and pink composite has been used to camouflage the labially placed implant and improve aesthetics and individualised maintenance provided to maintain a long term successful outcome.

At subsequent review appointments, the patient is satisfied with functional and aesthetic treatment outcomes, the soft tissues are clinically healthy and the prosthesis and restorations are sound.

Conclusion:

This case highlights the tipped implant technique that can be utilised to successfully restore edentulous arches. It also shows the techniques which can be used to overcome challenges in compromised implant positioning to maintain aesthetics in the anterior zone, as well as utilising minimally invasive techniques to restore tooth tissue surface loss.

Code SO6

Gagging - Where Do We Go From Here?

Bryan Murchie *(Newcastle Dental Hospital)*
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Gagging is an inborn protective mechanism which is designed to protect the larynx, pharynx and trachea. This reflex regresses to the tonsillar pillars after the fourth year of life, following maturation of oral functions and appearance of the first dentition. However, gagging related issues persist in some adults and are associated with 20% of dental avoidance cases. It is a hindrance for dental procedures which can be a stressful experience for both patients and dentists.

The two main categories for gagging patients are somatic and psychogenic. In the somatic group, the trigger is physical stimuli and five anatomical regions have been identified as major risk areas, including: base of the tongue, uvula, posterior pharyngeal wall, palate and fauces. In comparison, the psychogenic group is psychological in nature, which may be classical or operant conditioning. Patients will suffer from varying extremes of the gag reflex which have been categorised from grade 1 (physiological) to grade 5 (very severe).

The patient that will be discussed in this presentation was a 69 year old female with a partial dentition of the upper arch; the teeth had been lost due to a combination of "abscesses" and trauma. She had been attempting to wear a partial upper denture for approximately five years without any success due to instant "retching" when she inserted it into her mouth. The patient had been provided with a variety of dentures over the years, including: acrylic, cobalt chromium and valplast, and believed that dentures "did not work" for her. The patient had been told by her GDP that she was now eligible for NHS implants due to her denture history.

A grade 4 gag reflex was determined which was elicited even during a simple clinical examination, i.e. fingers and instruments contacting the mucosa. This was particularly prominent on the hard palate and was triggered within 6mm posterior to the incisive papillae. This was further complicated by a prominent class III skeletal pattern and over-closing due to a lack of occlusal contacts.

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This presentation will outline the difficulties associated with treating this very challenging patient case. The main issues were attributed to her heightened anxiety, history of depression, high aesthetic demands and an assumption that the dental hospital would resolve her problems with a fixed implant prosthesis. A well-fitting upper training plate was provided with multiple post-dams. Behavioural modification techniques were encouraged over numerous appointments, without any progress. It was eventually decided that the patient required a referral to a clinical psychologist.

Firstly, this presentation will discuss how to effectively approach and manage patients with unrealistic expectations. It will then highlight the realities faced by dentists when treating patients with extreme gag reflexes and the need to include colleagues from other medical backgrounds. Importantly, the author will draw the clinicians' attention to the current lack of evidence and the limitations of modern dentistry. Consequently, the available treatment options for gagging patients can be very restricted. Therefore, we must address this issue now and decide where we can go from here.

President poster

Code PP1

Odontogenic Myxoma Of The Maxilla- Diagnostic Considerations, Surgical Resection And Digital Prosthetic Rehabilitation

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Introduction:

Odontogenic myxomas are benign but invasive tumours of mesenchymal origin. Diagnosis is most commonly established by biopsy. Due to the low incidence and variable clinicopathological behaviour there is no definitive management algorithm.

Aim:

To review

a) The management of a 16-year-old patient at York Teaching Hospital from diagnosis to tumour resection and prosthetic rehabilitation.

b) The use of digital/ virtual planning software for surgery and prosthesis design.

Investigations:

After orthodontic treatment a general dental practitioner noticed an asymptomatic buccal expansion in the right maxilla. OPG radiograph and CBCT revealed a lesion from the UR3 to the UR6 causing thinning and expansion of the buccal cortex with no evidence of resorption. Macroscopically a biopsy showed a thick jelly like white material invading into bone. Microscopically spindle cells in a mixoid stroma with no cytologic atypia or evidence of malignancy were noted.

Treatment:

A segmental resection with a safe margin was performed along with the fitting of an immediate removable prosthodontic appliance.

Conclusion:

Clinical presentation, different image modalities, special staining and immunohistochemistry are important for a diagnosis. Curettage and peripheral ostectomy alone is not sufficient as these lesions are not encapsulated and because the myxomatous tissue infiltrates adjacent bone.

Successful rehabilitation of patients with invasive and locally aggressive lesions of the head and neck requires careful treatment planning with the restorative team. In this case it involved the design and provision of both an Essex retainer and a clasp retained upper partial denture to allow immediate phonetic, masticatory and aesthetic function. Future reconstruction will possibly involve bone grafting and implants but this is delayed due to high recurrence rates.

Digital software can used for initial surgery planning around bone/soft tissues and to design a guide for bone cuts. It can also be used to design a prosthetic appliance after initial tumour resection and after a period of healing, and to plan implant placement with or without a stent.

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Code PP2

Orofacial Rehabilitation With Zygomatic Implants, CAD-CAM Bar And Magnets For Patients With Nasal Cancer After Rhinectomy And Partial Maxillectomy

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Malignancy of the nasal septum or vestibule is rare affecting 0.29 per 100,000 of the population. The incidence of nasopharyngeal cancer has remained stable for the majority of the population however occurrence rates are increasing in women. Treatment depends on the extent of disease and includes surgical excision and radiotherapy. Surgery is often the modality of choice, and if bone is involved rhinectomy is indicated. In rare cases nasal malignancies locally invade the maxilla and thus treatment involves partial maxillectomy alongside rhinectomy.

Due to the nature of surgical treatment, patients with nasal malignancy can be left with substantial facial defects. Surgical reconstruction of large defects, particularly following radiotherapy, are associated with increased surgical morbidity and aesthetic outcome is unpredictable and often poorer than a prosthesis. For nasal rehabilitation, a prosthesis is often better than reconstruction as it allows easier post-operative monitoring and more predictable aesthetic outcome. More recently zygomatic implants have shown to provide successful and predictable retention of nasal prostheses. Obturator prostheses replacing the maxilla and associated dentition are frequently used for the rehabilitation of maxillary defects and also benefit from osseointegrated implants for improved retention.

This case series describes the treatment of three patients diagnosed with SCC of the nasal septum who underwent rhinectomy and partial maxillectomy. Bilateral zygomatic implants were placed at the time of surgery, and fabrication of implant-retained customised milled bars achieved concurrent retention for both nasal and obturator prostheses. The benefits of the prosthetic rehabilitation described in this article include active retention of maxillary obturator and nasal prosthesis using magnetic retention, improved ability to re-establish functions such as speech, mastication and swallowing, improved ability to recover social life as soon as possible following surgery, ability to remove both nasal and oral prostheses to allow examination of tissues, ease of insertion and removal of prostheses for patient, provision of upper lip support from obturator and avoidance of further invasive oral surgical procedures (e.g. dental implant placement, bone grafting) for obturator retention.

Code PP3

Management Of Developmental Defects Of Enamel In Permanent Teeth Using Minimally Invasive Techniques: Case Reports

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BACKGROUND:

Developmental defects of enamel (DDEs) including hypoplastic and other opaque and discoloured lesions often result in visible aesthetic deficits- especially when present in the aesthetic zone. They occur as a result of disruption in enamel formation and morphogenesis and may be attributed to systemic, genetic, local or environmental factors. Furthermore, they may be associated with an increased risk of caries, necessitating restorative care as well as psychological, emotional and social obstacles for patients. Restorative management of affected teeth also presents a challenge for clinicians, as the ultimate goal of achieving an acceptable, aesthetically pleasing outcome can be difficult to achieve both technically and from a patient satisfaction perspective.

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CASE REPORTS:

We present three cases of DDEs in the aesthetic zone managed in secondary care using minimally invasive techniques. A 16-year-old male patient was treated for enamel hypoplasia (mixed opaque and brown lesion) affecting the coronal third of tooth 21 (UL1) labially. The lesion was minimally prepared with a high-speed bur to remove defective surface enamel followed by camouflage using direct, layered composite. A 22 year old female with a high functional lip line referred from primary dental care for management of enamel hypoplasia in the upper anterior sextant was treated using micro-abrasion under rubber dam followed by direct composite veneers. Finally, a 26-year-old female patient was treated for upper anterior hypomineralisation with a combination of micro-abrasion under rubber dam and external bleaching with 16% carbamide peroxide.

CONCLUSION:

All patients reported acceptable outcomes in terms of aesthetics, function and comfort. All three cases were managed using minimal tooth surface preparation ensuring structural integrity of teeth was maintained. These minimally invasive techniques are ideal for younger patients presenting with DDEs.

Code PP4

Osteopetrosis; An Unusual Dental Finding: A Case Report

Funmi Olowajana *(Charles Clifford Dental Hospital, Sheffield)*
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Introduction:

The following case report aims to remind clinicians of the value of critically assessing radiographs so the full diagnostic potential is achieved and to bring to attention how osteopetrosis may be an incidental finding based on dental observations.

Background:

Osteopetrosis is a rare congenital disorder, with a prevalence of 1 in 100,000-500,000, characterized by the failure of osteoclasts to resorb bone, resulting in increased bone density. The disturbed bone turnover process results in skeletal fragility despite increased bone mass, obliteration of marrow spaces causing haemopoietic insufficiency, nerve entrapment syndromes, impaired vision and hearing, disturbed tooth eruption and growth impairment.

In humans, 3 forms are seen; infantile, intermediate and adult onset. Most children with the infantile form die in infancy due to severe anaemia, bleeding or infection. The adult onset form has a good prognosis and is compatible with a normal life span. Approximately 50% of patients with adult onset osteopetrosis are diagnosed incidentally during late adolescence or early adulthood. Many complain of bone pain and have neuropathies due to cranial nerve entrapment. If the mandible is involved, fractures and osteomyelitis may occur following tooth extraction. Physically these patients often have a short stature, frontal bossing and a large head (Stark Z, Savarirayan R. Osteopetrosis. *Orphanet J Rare Dise*, 2009; Beighton P, Hamersma H, Cremin BJ. Osteopetrosis in South Africa. The benign, lethal and intermediate forms. *S Afr Med J*, 1979; Del Fattore A, Cappariello A, Teti A. Genetics, pathogenesis and complications of osteopetrosis. Bone, 2008).

Clinical Report:

A 16-year-old female was referred to the Department of Restorative Dentistry at the Charles Clifford Dental Hospital for replacement of bilateral missing maxillary canines, which had been surgically removed due to ectopic positioning. The patient had been seen previously in the Orthodontic Department to align the teeth and create optimal space for prosthetic replacement directed by the Restorative Consultant. However, on review of the radiographs, it was noted that the bone appeared very dense.

The patient's past medical history revealed a long history of complaints relating to bone and joint pain for which she had been seen by Paediatric Rheumatology. She had also undergone a number of procedures for problems with her eyes and ears. Family history revealed osteoarthritis and the death of an infant due to an underlying bone disease. Physical examination revealed a short stature with a large head and frontal bossing.

In view of the radiographic appearance of the bone, consent was obtained to explore the bone and take a biopsy, and to investigate the potential used of dental implants in the future. However, the cortical bone was incredibly difficult to. The bone that was collected was then sent for histopathological evaluation. The radiographs were also reviewed by a maxillofacial radiologist. Both reports stated the appearances were consistent with osteopetrosis.

This information was communicated to the patient's GP, who was then able to make a referral to the Metabolic Bone Centre. Radiographs of the patient's spine and pelvis were taken and a bone mineral density scan was performed; a diagnosis of osteopetrosis was confirmed.

Conclusion:

This clinical case highlights the value dentistry has in the overall medical wellbeing of the patient and the importance of seeing the value in the patient's medical history in their dental management.

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Code PP5

Management Of Lost Dentition And Associated Structures With Implant Supported Milled Beam And Removable Partial Denture

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This case report describes the management of large traumatic defect in the anterior maxilla resulting from a gunshot attack. Management involved the use of an implant supported milled beam and replacement removable partial denture to replace the lost dentition and associated structures.

Background:

The patient suffered a gunshot attack 18 years ago, resulting in loss of the upper left anterior teeth and associated alveolar bone, resulting in an extensive defect. Initial treatment had involved an iliac crest bone graft and placement of three dental implants, with prosthodontics rehabilitation comprising of a milled gold beam and removable partial denture. The patient required a replacement of prosthesis as he had lost the original one.

Management:

As the milled beam was still intact, treatment involved a new abutment level impression and construction of a removable partial denture with a corresponding sleeve to engage the original milled beam. Careful attention to matching the prosthesis with the adjacent gingival tissues was achieved with laboratory support.

Clinical stages:

1. The retained screws of the implants (UL2, UL3) were unscrewed to remove the existing milled beam on upper left segment.
2. Impression copings were attached to the implants (UL2, UL3) with long attachment screw.
3. Impression copings were luted together with the use of dental floss as a scaffold for the autopolymerization resin.
4. Open tray impression technique is used to pick up at uni-abutment level with Impregum.
5. Existing milled beam was sent to the laboratory.
6. Try in of upper denture teeth with Enigmalife Shade B2 to match the adjacent teeth.
7. Fit of implant –retained partial denture.

Conclusion:

The clinical stages and materials are presented which resulted in a highly aesthetic, stable and retentive prosthesis.

Code PP6

Nylon Derived Removable Prostheses - Two Case Reposts And A Review Of The Literature

Jatinder Moore, Sehrish Khalid, Despoina Chatzistavrianou, Professor Damien Walmsley (Birmingham Dental Hospital)
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Introduction:

Removable prostheses are primarily constructed from polymethyl methacrylate acrylic or cobalt chromium alloys. In certain occasions, nylon derived removable prostheses are the only option due to severe undercuts or limited mouth opening. The main drawback with nylon is its long-term durability. There is limited evidence to support the use of nylon thermoplastic material in the manufacture of dentures. The aim of this poster is to present a review of the literature and two case reports regarding nylon derived removable prostheses.

Nylon derived dentures can provide good aesthetics and comfort. Their advantages include thin construction, flexiblity, good biocompatibility and they do not absorb odours or stains. However, they are not seen as long-term prostheses but rather used for provision-

al or temporary purposes. They are made on a cast produced from an alginate impression but are technique sensitive to construct and are also difficult to repair. They are susceptible to discolouring as they absorb water and their durability is considered poor in clinical service. Additionally, the acrylic teeth can de-bond from the nylon denture base. There is limited evidence regarding the performance and longevity of these dentures over conventional materials.

Case Presentations:

The first patient presented is an 81-year-old female who could not tolerate conventional acrylic dentures with an edentulous maxilla and partially dentate mandible. She received a conventional acrylic upper complete and lower nylon derived (valplast) denture. The patient was satisfied with the outcome.

The second patient is a 70-year-old female with partially dentate mandible and severe undercuts that prevented the use of a cobalt chromium denture. She received a lower nylon derived (valplast) denture to replace the mandibular missing teeth. At the 6 month review appointment, the patient was satisfied with the functional and aesthetic outcome of the treatment and the prostheses were intact.

Conclusion:

In summary, although there is limited evidence to support the use of nylon derived dentures, they can be a viable treatment modality in certain cases such as for partially dentate arch with severe tissue undercuts, especially where conventional treatment has been unsuccessful. More clinical research is needed.

Schottlander poster

Code SP1

The Potential Of Nanofabricated Denture Surface For Prevention Of Denture Stomatitis

Hasanain Alalwan, Douglas Robertson, Christopher Nile, Nikolaj Gadegaard and Gordon Ramage (Glasgow Dental School & Hospital)
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Introduction:

Denture stomatitis (DS) is a common disease affecting denture wearers that is frequently associated with colonization by pathogenic microbial biofilms, of which *Candida spp.* predominate. Strategies to minimise this are urgently required to reduce the prevalence of this condition. Taking lessons from nature such as the lotus leaf, cicada wings and shark skin, where microbial colonization can be limited by natural modification of surfaces on a micro and nano scale, then we can use these same principles to modify the surface of the biomedical materials used in denture construction to obtain an antimicrobial effect.

Hypothesis and Aims:

We hypothesise that nanofabricated denture based materials can reduce or prevent microbial adhesion, therefore we aim to test develop and test nano-indented materials and quantify the adhesion capacity of *Candida albicans*.

Methods:

Polycarbonate nanofabricated sections with different arrangements of nano-pits were interrogated for its anti-adherence capability to *Candida albicans* using quantitative PCR compared to unfabricated surfaces. In parallel, the effect on adhesion to these nanomaterials was assessed through quantitaive transcriptional assessment of key adhesin genes. The optimal nano-pattern was then used in a compression molding method to produce and replicate the patterns on PMMA, and quantitative assessment of *C. albicans* further assessed as above.

Results:

In comparison to the flat and other nano-pits arrangements, a square form arrangement pattern of nanofabricated surfaces has reduced the candidal adhesion quantitatively in both yeast and germling forms. This was supported by gene expression data that showed a significant down-regulation of some key adhesin genes in both two morphological form of the *C. albicans*. Via analysis of the scanning electron microscopy images, nano-replication indicated the potential for nano-indentation of PMMA, where subsequent studies showed similar anti-adhesion properties.

Conclusions:

These data indicate the potential to use nanofabricated PMMA surfaces and the use of nanotechnology in general within prosthetic dentistry in order to improve the general well being of the patient population.

An Outcome Audit of Dental Implants Performed by Postgraduate Students on the Masters of Clinical Dentistry (Prosthodontics) Programme, Cardiff University

Omir Aldowah, Safa Somi, Jeremy Rees (Cardiff Dental School)
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Introduction:

Implant therapy as a treatment option for replacing missing teeth is a widely accepted therapy. Many success and survival definitions and criteria have introduced to measure implants outcome. Among them, several studies have demonstrated high implant success and survival rate of more than 90% up to 100% depending on the follow up time of these studies. Longevity of implants is controlled by numerous factors which may be related to patients, implants, or clinicians.

Aims & Objectives:

The aim of this outcome audit was to evaluate the success and survival of dental implants performed by postgraduate students on the Masters of Clinical Dentistry (Prosthodontics) programme in the School of Dentistry, Cardiff University.

Materials & Methods:

Records of patients treated with Straumann implants between October 2011 and September 2015 were screened. Eligible patients were contacted and invited to undergo a clinical and radiographic examination. Each implant was classified according to high standard success criteria. Success was accounted and defined by the presence of following parameters according to Gallucci *et al.*:

1. No implant mobility and no signs of constant infection, discomfort or radiolucency (5).
2. Bone loss at first year less than 1.5 mm and the annual bone loss less than 0.2 mm thereafter.
3. A mean modified plaque index (mPI) and modified bleeding index (mBI) value of ≤1.
4. A mean probing depth is < 5 mm.
5. Preservation of at least 1.5 mm of keratinized mucosa.
6. Four or less complications of mild/moderate severity in prostheses.
7. Overall patient satisfaction with treatment rated as either good/excellent.

Patient satisfaction was measured using the modified questionnaire described by Pjetursson *et al.*. Participants answered questions using a five-point scale, where 5 meant very satisfied, and 1, not at all satisfied. For general satisfaction, visual analogue scale (VAS) was a 10 cm straight line with the left end denoting extreme satisfaction and the right end, extreme dissatisfaction.

Survival was defined as implants or prostheses that did not need to be replaced.

Results:

Thirty-eight patients with 84 Straumann implants were available for assessment. The mean age of the patients was 49.05 ± 13.19 years. Over the 5-year period, no implant fracture was noted. 8 implants were considered as a failure (9.5%). Two implants (2.4%) demonstrated signs of suppuration, and another 6 implants (8.3%) showed bone loss greater than the range defined as success. Two crowns had severe complications (unrepairable fracture). The remaining 76 implants fulfilled the success criteria (90.5%). The mean mPI was 0.36, the mean mBI 0.5, the mean probing depth 2.6 mm, and the mean bone loss was 1.2 mm. Regarding satisfaction, by using non-parametric sign and Wilcoxon Signed-rank test. P-value showed that all the responses were statistically higher than the test median value of 3. The median value of general satisfaction using VAS was 9 out of 10.

Conclusions:

This audit showed a 5-year implant survival rate of 100% and a success rate of 90.5%.

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Code SP3

Elastic And Viscoelastic Properties Of CAD/CAM Polymer-Based Ceramics

Nada Alharbi, Xiaohui Chen, Julian Satterthwaite, Nikolaos Silikas (University of Manchester Dental School)

Introduction:

Ceramics demonstrate chemical stability, excellent biocompatibility and good mechanical and optical properties. However, catastrophic failure still occurs and the repair of those failed restorations is often problematic. In contrast, resin composites are easier to operate and repair, but with less desirable wear, biocompatibility and mechanical properties. Polymer based ceramics (PBC) with various polymer matrix compositions and different percentage of ceramic fillers have been developed to provide better mechanical properties, lower discoloration rates, and higher wear resistance than the conventional resin composites. They are currently available as monolithic blocks fabricated for CAD/CAM systems. However, little is known on their elastic and viscoelastic properties and their mechanical behaviours.

Materials & Methods:

Twenty five bar shaped specimens (12x4x2 mm) were prepared from five different PBC blocks. The surface morphology of the PBC was studied by Scanning Electron Microscopy (SEM). Micro hardness of the specimens was measured using Vicker indenter under a load of 100 gf for 10 s at room temperature. Nano hardness was tested under a 50 g load with a 10 s pause/dwell. The hardness results obtained by micro indentation and nano indentation of all 5 test groups were compared using one-wayANOVA ($p \leq 0.05$).

Results:

The mean nano hardness values of the studied PBC ranged from 0.32 to 7.05 GPa. For the micro hardness, the mean values ranged from 25.8 to 499.9 HV. Mean Elastic modulus ranged from 4.66 to 76.40 GPa. Statistically significant differences were found between the tested materials for all the studied mechanical properties. Positive correlation between the amount of ceramics (in wt%) and both micro hardness nano hardness data were observed.

Conclusions:

Different PBC materials show different surface morphology of fillers in different size, shape and density. Micro hardness and nano hardness of the studied PBC materials increased systematically with an increase in filler loading.

Code SP4

Oral Health-Related Quality Of Life Improvements After Different Dental Prosthodontic Treatments In Partially Dentate Patients: A Systematic Review And Meta-Analysis

Zaid Ali, Mario Vettore, Shirin Shahrbaf, Nicolas Martin, Sarah Baker (The University of Sheffield & Sheffield Teaching Hospitals Trust)
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Introduction:

Dental prostheses such as removable partial dentures (RPD), tooth-supported fixed bridgework (FBW), implant supported removable dentures (ISRD), fixed bridges (ISFB) and single crowns (ISSC) are treatments to replace missing teeth, which may improve oral health-related quality of life (OHRQoL) by reversing or overcoming negative impacts of tooth loss. OHRQoL is often measured using patient reported outcomes such as OHIP and GOHAI, which give outcome scores that may be numerically converted to a standardised mean score based on the range of possible scores for each measure. The impact of rehabilitation on the edentulous patient is well-documented, however the impact of this range of options on OHRQoL in partially dentate patients is less well understood.

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Aim:

The aim of the study was to quantify degree of improvement achieved by each of these interventions on OHRQoL in partially dentate patients by means of systematic review and meta-analyses.

Methods:

Structured literature search of MEDLINE (Ovid & Pubmed), WoS, Cochrane, NHSEED and HTA databases was conducted to identify articles describing investigations of change in OHRQoL measures following: ISSC, ISFB, ISRD, FBW and RPD in partially dentate patients. Selection criteria were applied and references of included articles reviewed. Data on the type of prosthesis, OHRQoL measure, scoring system, change in OHRQoL score and standard deviation (SD) were extracted and change scores converted to standardised mean change (SMC) and standardised SD based on scoring range. SMC and SSD were assessed by meta-analysis.

Results:

2105 articles were reviewed, 882 from electronic databases and 1223 from references and systematic reviews. 23 studies were included for analysis including two randomised controlled trials and 21 longitudinal/cohort studies. ISRD could not be included in meta-analysis due to insufficient data. At short-term follow-up, ≤9-months, ISFB, FBW and RPD showed significant improvement in OHRQoL. At longer-term follow-up, >9-months, only ISFB and FBW showed significant improvement compared to baseline. Direct comparison of ISFB against FBW and RPD was possible for short-term follow-up and favoured ISFB in each case.

Discussion:

FBW, RPD and ISFB showed a demonstrable improvement in OHRQoL at follow up periods ≤9-months. At follow-up of >9-months only FBW and ISFB maintained significant positive changes in OHRQoL. Direct comparison of ISFB against FBW and FBW showed greater improvement in OHRQoL for ISFB. Unfortunately there were insufficient data to include ISRD into the meta-analysis, and this is one area where further high quality studies investigating both the impact of interventions on OHRQoL and the cost effectiveness would be welcomed.

Only two studies in this review were found to be level 1b, with the majority being classed as level 2b further high quality prospective trials controlling for confounders such as the site of tooth loss and number of teeth being replaced is recommended.

Code SP5

Management Of The Anatomically Challenging Denture Bearing Area (DBA)

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Aim:

This case report aims to document the provision of complete dentures complicated by an undercut lower ridge, flabby tissue present and bony exostoses resulting in an uneven base to retain a lower denture

Introduction:

The stages of conventional complete denture construction are often modified to accommodate for altered anatomy. Numerous impression techniques have been discussed for management of a flabby ridge,[1] [2] for overcoming an undercut ridge and also for creating a stable denture base[3] and it is these which are key to successful denture provision.

Case Description:

A 78 year old female presented to the dental hospital complaining that her upper denture repeatedly drops down whilst functioning and requires copious amounts of fixative to obtain a good fit. She also commented that her lower denture (made at the same time) moves while talking and frequently drops out of its own accord.

The patient suffered with type 2 diabetes, asthma, osteoarthritis (resulting in compromised manual dexterity) and hypertension.

On examination both upper and lower dentures showed underextension in the tuberosity regions and retromolar regions. Both upper and lower ridges were of irregular appearance; the upper having a broad base with numerous bony exostoses and the undercut lower ridge having a degree of flabby tissue anteriorly.

The case depicts the stages in conventional complete denture construction with modified master impression and registration techniques to overcome the undercut & flabby lower ridge, and the irregular quality and increased size of the denture bearing tissues.

The patient was satisfied with the final result and is able to function better as a result of treatment provided.

Conclusion:

Conventional techniques using contemporary materials can produce more than satisfactory complete dentures, this case demonstrating some of the techniques used to overcome an anatomically challenging denture bearing area.

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Code SP6

A Systematic Review Of The Time That It Takes For Occlusion To Re-Establish Following The Placement Of Restorations At An Increased Occlusal Vertical Dimension

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Context:

The principles of the Dahl appliance can be applied predictably to a range of clinical situations. This is ever more the case as dentistry moves towards minimally invasive techniques. The time it takes for the re-establishment of occlusion following the placement of restoration(s) at an increased OVD is understandably important to patients before embarking on such treatment as well as to the clinician. The available evidence on the amount of time this process takes or how predictable it is has not been well established. There are no systematic reviews of the current available literature that address the uncertainty of the time it takes for the occlusion to re-establish and stabilise following the placement of restorations at an increased occlusal vertical dimension.

Objective:

To investigate how predictable the re-establishment of occlusion is following the placement of a restoration at an increased OVD, how long does the process takes, are there predictive variables and the quality of the available evidence.

Data Sources:

A systematic review of articles using MEDLINE (1946-present), EMBASE (1974-present) and the Cochrane databases. Searching through relevant bibliographies and identifying additional studies. Search terms included dental restoration, vertical dimension and time, amongst others. No study design, date or language limits were imposed. Only human studies were included.

Study Selection:

All studies which involved the placement of dental restorations at an increased OVD and that recorded the time taken for the occlusion to re-establish were selected. Eligibility assessments were carried out independently by two reviewers and peer reviewed by a third. Differences were discussed and resolved by consensus.

Data Extraction:

Independent extraction of predefined data fields including study quality indicators was completed by one review author and reviewed by a second.

Results:

The search provided 61 results after duplicates were removed. From this 11 papers were deemed to be relevant. Following bibliography searching a further 5 papers were identified for full text analysis. Full texts of the 16 papers were then assessed; 4 had used the same data from previous studies and 3 were excluded after full text assessment, as they did not record the time taken for occlusion to re-establish. This resulted in a total of 9 relevant papers that were included in the systematic review.

Conclusions:

The evidence available indicates that the technique of placing restorations at an increased OVD appears to be clinically predictable in terms of re-establishment of occlusion. It would appear that the process is quickest in younger patients. There are many clinical situations in which this minimally invasive approach can be, and has been, applied successfully. There is a need for high quality studies that evaluate more specifically the time such a process takes and what variables, if any, relate to the amount of time or predictability of this occurring including the amount of separation, aetiology of tooth surface loss if any, age and restoration position.

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Code SP7

Setting The Standard For Testing AKP Clasps In The Digital Era

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Background:

Adult dental health surveys show increasing numbers of partially dentate patients. Removable partial dentures (RPDs) are widely prescribed in practice. Cobalt chrome (Co/Cr) is currently the default material to provide tooth support. Recent advances in material science and digital manufacturing have provided alternative aesthetic materials, e.g. arylketone polymer (AKP).

Co/Cr has limitations when used for clasps: they undergo work hardening, distortion, and eventual fracture. Finite element analysis has shown AKP has the potential for use without being stressed beyond its elastic limit. This opens up the possibility of prolonged and improved retention for AKP denture frameworks. Research is needed to investigate the long-term retention of AKP clasps in comparison to Co/Cr clasps using a new improved protocol.

The Problem:

Previous protocols have not used tooth analogues with similar physical properties to natural teeth; improvement can be made. Secondly, in previous protocols the cyclic testing was stopped to measure the retentive force; simultaneous measurement would be advantageous. Thirdly, the angle at which the clasp is removed has been the 'path of insertion,' whereas in clinical use patients remove the denture along different paths.

Aim:

To present for peer review an improved protocol for testing clasps.

Protocol:

Background

above

Aim

The aim is to investigate the retentive force of AKP and Co/Cr clasps on tooth analogues *in vitro*.

Objectives

I. Measure the forces required to remove the clasps along the path of insertion.

II. Measure the forces required at an angle 10° away from that path.

III. Record changes over time.

IV. Investigate the fatigue of the clasps by assessing any de formation after cyclic testing using colour maps

Materials/Method

The Co/Cr clasps are the study control, designed to best practice: 15 mm long, engaging 0.25 mm undercut. The Co/Cr clasps are 3-D printed in resin then cast and polished to clinical standards.

The test group AKP clasps are designed using information from finite element analysis and then milled.

Tooth analogues are milled from lithium disilicate (IPS e-Max, Ivoclar Vivadent, Amherst, NY, USA) using a CEREC chairside milling machine. A new tooth analogue is used for each test.

The cyclic testing uses ElectroPuls™ E1000 Dynamic Test Instrument (Instron, Norwood, MA, USA). This allows the instantaneous measurement and recording of the force required to remove the clasp from the tooth during each of the 15,000 cycles. This will enable assessment of the timing and nature of any clasp failure, e.g. showing work hardening before catastrophic failure.

Primary outcome is the force required to remove the clasp from the tooth.

Secondary outcomes are:

I. Examination of the distortion of the clasp from the start to the end of the study, using colour maps

II. Recording of time point of any clasp failure

III. Examination of the mode of any clasp failure; analysing forces recorded immediately prior to failure

Removal force vs number of cycles will be plotted. Depending on normality of data, ANOVA or non-parametric test will be used for analysis.

Results:

See poster for internal pilot results.

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Code SP8

Contemporary Use Of Lasers In Dental Medicine

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Background:

Laser application is proven to cover all areas of work, both on soft and on hard tissue.

The treatment areas of laser application in dentistry involve surgery, restorative and aesthetic dentistry and periodontics.

Aim:

The research aims to evaluate the differences in use of laser techniques in comparison to the classical methods for the surgical therapies.

Material and method:

The study evaluated a number of 68 patients in a comparative study regarding the evaluation of 5 items concerning :bleeding, pain, rapidity of maneuver execution,sterilization and curettage and accuracy.

Results:

Significant differences were obtained for items concerning the bleeding, and pain, and also for time consuming maneuvers, with the highest impact on decrease of bleeding by 87% in comparison with classical surgery.

Regarding the sterilization and curettage there were no significant differences the discrepancies being observed in the reduced healing time after laser therapy in comparison to classical surgery.

Conclusions:

Laser interventions constitute a starting point for new techniques and approaches in surgical interventions by having multiple proven advantages.

Code SP9

Management Of Moderate Hypodontia And Associated Residual Posterior Open Bite (POB) With Minimally-Invasive (MI) Pressed Ceramic Adhesive Bridgework - A Case Study

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Objectives:

To demonstrate the effective application of all-ceramic adhesive bridgework as a MI prosthodontic management option for hypodontia and associated POBs refractory to specialist fixed orthodontic appliance therapy.

Background:

One challenge facing the restorative dentist, when planning restorations for patients with hypodontia (developmentally missing teeth), is that the alveolar bone which would have housed the secondary dentition does not develop fully. Orthodontic treatment can create sufficient mesio-distal space for restorations, but it cannot predictably stimulate vertical or bucco-lingual alveolar bone growth in edentulous saddles.

Consequently, spaces due to developmentally missing teeth often have insufficient bone volume for dental implant placement without adjunctive bone augmentation surgery or potential compromises in implant/crown biomechanics.

The aims of treatment in hypodontia patients are to restore function in an aesthetic manner, whilst also preserving the remaining teeth. This case demonstrates how fixed-fixed onlay-retained bridgework offers a MI option that restores vertical crown height of abutment teeth and replaces developmentally missing teeth to close POBs, as well as providing some orthodontic retention.

Case Description:

A twenty-two year old fit and well male was referred to Addenbrooke's Hospital Restorative Dentistry Service for consideration for dental implants to restore missing teeth in the mandibular dentition. His primary concern was difficulty eating. Lower right premolars (LR4, LR5) and lower left second premolar (LL5) were developmentally absent, and the primary predecessors had been extracted at 12 years of age. In addition to the atrophic edentulous saddles, he exhibited bilateral vertical alveolar deficiencies in the posterior mandible which contributed to bilateral POBs.

His spaces were restored with two bridges. Both were fixed-fixed design, onlay-retained and made entirely from lithium-disilicate-type ceramic (EMax, Ivoclar Vivodent). The lower right four-unit bridge replaced LR4 and LR5 with lower right first molar (LR6) and lower right canine (LR3) as abutments. The lower left three-unit bridge replaced LL5 with lower left first molar (LL6) and lower left first premolar (LL4) as abutments. The infrocclusion of the abutment teeth allowed for minimal occlusal reduction and onlay preparations were consequently confined to enamel.

Discussion:

The use of onlays as retainers was minimally invasive, provided optimal surface area for enamel bonding, and did not impact on the periodontium.

It produced a flat occlusal plane and also allowed for sufficient volume of the connector area compatible with the ceramic's physical properties.

The use of lithium-disilicate ceramic gave a more aesthetic result than metal-ceramic resin-bonded bridgework with metal wings. The bridges may provide some orthodontic retention, and the use of modified ridge-lap pontics provided an aesthetic result to mask the alveolar defect.

Conclusion:

Fixed-fixed onlay-retained all-ceramic bridges may be a useful, MI treatment modality when a POB situation exists in hypodontia patients post orthodontics treatment.

Code SP10

Conversion Of An Overlay Denture To An Overdenture: A Case Report

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Overdentures offer bone maintenance, improved retention and stability, improved sensory feedback and control of mandibular movement. Although overdentures offer several advantages over conventional dentures, increased caries and periodontal disease risk are the main complications often leading to increased cost and time of treatment. The aim of this poster is to present a case report of a maxillary overdenture using simple techniques that can be applied in the everyday clinical practice.

A 77 year old female patient attended Birmingham Dental Hospital complaining of unretentive and unstable denture leading to functional and aesthetic concerns.

Presenting clinical observations included a high lip line exposing the gingival margin and there was inadequate freeway space with her denture in situ. Intraorally, there were anterior retained roots in the maxilla as a result of failing restorations. Dento-alveolar compensation has taken place. An overlay denture which covered the anterior teeth and roots restored the aesthetics. Radiographic and electric pulp tests of the maxillary anterior teeth indicated no evidence of root canal treatment or pathology.

The patient opted to maintain her remaining teeth and the treatment plan included to convert anterior teeth to overdenture abutments and provide a maxillary overdenture.

The anterior teeth were prepared as overdenture abutments and her existing denture was relined with hard lining material to improve retention. Dentine bonding agent was applied over the overdenture abutments to reduce the risk of sensitivity and caries.

A light cured acrylic base plate was constructed to assess the retention of the final prostheses at an early stage of construction. Teeth were repositioned anterior to the alveolar crest to increase freeway space and improve aesthetics. At the fit stage of the maxillary prosthesis, individualised maintenance was provided. The patient was satisfied with the functional and aesthetic outcome of the final treatment. The patient has been given a strict recall regime to assess the level of oral hygiene, the status of teeth and the integrity of the prosthesis.

Overdentures can offer an alternative treatment modality compared to conventional dentures but a successful outcome requires careful case selection, treatment planning, and individualised maintenance.

Feasibility And Accuracy Of Capturing Oncology Facial Defects With Surface Scanning: A Proof Of Concept Study

Rachael Jablonski, Andrew Keeling, Balvinder Khambay, Cecilie Osnes, Brian Nattress (Leeds Dental Institute)
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Introduction:

A diagnosis of head and neck cancer has a major psychological and physical impact on patients and over 11,000 new cases were reported in the United Kingdom in 2014. Approximately half of head and neck cancer patients require major tumour resection and the resultant defects can be closed through surgery or restored with removable prostheses. Conventional facial prostheses are fabricated on stone casts formed from an impression of the defect which captures both the facial border and the depth of the defect. These impression techniques have multiple disadvantages including inaccuracies due to soft tissue deformation and patient discomfort.

Various case reports have indicated significant potential benefits of surface scanning as an alternative to conventional impressions. These include improved patient comfort, efficiency of data collection and earlier rehabilitation following surgery due to a less invasive technique. Computer aided manufacturing procedures are also enabled and digital data storage may simplify replacement of deteriorating prostheses.

Aim:

This proof of concept study aimed to assess the feasibility and accuracy of using surface scanning to capture oncology facial defects based on plaster models. External facial features captured by stereophotogrammetry were fused with the internal defect recorded through optical scanning to produce a virtual composite model.

Methods:

Ethical approval was obtained. Ten stone casts of a variety of oncology facial defects were acquired from the maxillofacial laboratories within Leeds Teaching Hospitals and Bradford Teaching Hospitals. For the gold standard, a 3D volumetric scan of each cast was taken with a CBCT scanner (NewTom VG). This was converted into surface data using an open source medical segmentation software (ITK Snap, http://www.itksnap.org/) and cropped to produce a CBCT mask using an open source system for editing meshes (MeshLab, http://meshlab.sourceforge.net/). To create the experimental model, the external facial features were captured using stereophotogrammetry (DI3D) and the defect was recorded with a custom optical structured light scanner. The two meshes were aligned, merged and resurfaced using MeshLab to produce a composite model. The CBCT mask and composite model were aligned to each other and analysed in MeshLab.

Results:

The Hausdorff distance was used to measure the absolute deviation of each composite model from the CBCT mask. Colour error maps were produced for each CBCT mask to demonstrate points on the composite model which were within different parameters for distance. Results for two composite models were outliers as data had been missed from extreme undercuts. Therefore, the corresponding casts were marked by a maxillofacial prosthetist to identify the prosthesis margins. The Hausdorff distance was reassessed excluding data points within the defect which lay several millimetres from the clinically relevant area. Mean deviation of the 10 composite models from the CBCT masks was 0.22mm (standard deviation 0.04mm).

Conclusion:

This novel method for merging two independent scans to produce a virtual composite model shows potential as an alternative method of capturing facial defects. Further research is required to explore its use in the clinical environment.

Acknowledgements:

This research was supported by a grant from the Royal College of Surgeons of Edinburgh (ID:109656).

Code SP12

An Exploratory Study Investigating the Experiences & Attitudes of Dental Implant Clinicians in the Management Of Peri-Implantitis within the United Kingdom

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Objectives:

Despite the increasing popularity of dental implants, peri-implantitis remains one of the significant and challenging complications that could threaten the long-term survival of implants. Although there have been different treatment modalities suggested in the management of this condition, there remains a lack of a "gold standard" protocol to manage it successfully and predictably. The aim of this study is to explore:

The experiences, attitudes & challenges that face dental implant clinician in the management of peri-implantitis

Relative surgical & non-surgical treatment modalities in managing peri-implantitis

Attitudes towards resources available in the management of peri-implantitis

Methodology:

A validated online questionnaire was formulated and emailed to BSSPD & ADI clinicians within the United Kingdom. The survey became live on the 10th November 2015, and stayed open until the 5th January 2016 which allowed eight weeks for the clinicians to respond. The questionnaire utilised both open and closed question types as well as additional free text boxes to allow for greater expression of opinion. It was self-administered and took no longer than 10 minutes to complete. Ethical approval from the Dental Research Ethics Committee was gained before the participants were contacted. No objective outcome measures were selected, as the data is based on each clinician's experience with the disease. The quantitative data was analysed using descriptive statistics as a method of univariate analysis. The qualitative data was analysed by coding the data into categories.

Results:

72 clinicians responded to the questionnaire. All of the respondents faced many challenges during the treatment of peri-implantitis, with the most frequent difficulties being lack of treatment consensus and unpredictable treatment outcomes, recorded by 79% and 78% of participants respectively. There were large variations in attitudes towards which surgical and non-surgical treatments were believed to be effective. Ultrasonic debridement was the most popular effective non-surgical treatment and open flap debridement was the most popular surgical method. 60% did not feel confident in managing peri-implantitis with current resources. However, despite the lack of confidence, 65% of respondents reported that they managed the disease themselves. In addition to the lack of confidence in treating peri-implantitis, 54% of the participants did not find any available guidelines effective for the management of the disease.

Conclusion:

The results of this survey highlight the marked differences in opinion and attitudes of clinicians in the management of peri-implantitis, with many clinicians expressing lack of confidence when presented with this condition. This study also shows a large variation in surgical and non-surgical treatment modalities in the management of peri-implant pathology, which is due to the lack of worldwide consensus today. Most clinicians reiterated the urgent need to develop evidence based treatment guidelines to successfully & predictably manage this condition.

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Code SP13

Management of Failing Implants Associated With Osteoradionecrosis Post-Head and Neck Cancer and The Role of A CAD-CAM Bar in the Remedial Restoration

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Objective:

To illustrate the effective application of CAD-CAM technology in creating a precision implant-retained prosthesis that optimised results following loss of implants associated with osteoradionecrosis.

Background:

The oral rehabilitation of head and neck cancer patients poses multiple challenges to the restorative specialist. These patients frequently receive adjuvant radiotherapy as part of their treatment, with sequale including predisposition to osteoradionecrosis, salivary dysfunction and trismus. Dental implants play an important role in the treatment of these patients, however the risks of failure are increased in irradiated patients.

Case Description:

A 64-year-old male patient was referred to Addenbrooke's Hospital Maxillofacial service with a history of pain in the right mandible and extra-oral sinus in the symphyseal region. Ten years previously he had received resective surgery and free flap reconstruction followed by radiotherapy for squamous cell carcinoma of the anterior floor of mouth.

His secondary oral rehabilitation had included a mandibular implant supported hybrid bridge from the lower right first premolar (LR4) to the lower left second premolar (LL5), retained by five implants. The patient was unable to cleanse around this bridge partly due to a lack of vestibule and keratinised tissue around the implants. Following radiographic examination, he was diagnosed with osteoradionecrosis of the right anterior mandible with involvement of two implants. Chronic periapical periodontitis associated with the lower right second molar (LR7) was also diagnosed.

Management involved dismantling the fixed prosthesis, removal of the two failed implants, debridement of necrotic bone, extraction of LR7 and surgical treatment of peri-implantitis affecting the remaining implants. To improve the quality of the peri-implant mucosa and cleansability of the residual implants, a vestibuloplasty was performed using autologous palatal free gingival grafts. Following resolution of the peri-implantitis around the residual implants, the lower arch was then definitively restored with an overdenture retained by the remaining implants linked with a CAD-CAM milled Createch bar.

The case highlights how the soft tissue anatomy post floor of mouth tumour resection and reconstruction can lead to fixed implant prostheses that are uncleansable. Recurrent peri-implant infections may also have contributed to the initiation of the osteoradionecrosis. The surgical enhancement of the peri-implant soft tissue environment and use of a precision CAD-CAM over denture helped to resolve a failing situation and avoid a pathological mandibular fracture.

Conclusion:

This case illustrates the successful application of CAD-CAM technology in the management of a case complicated by implant failure associated with osteoradionecrosis.

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Code SP14

Fit Accuracy of Interim Crown Fabricated By Photopolymer Jetting 3D Printing Technology

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Problem Statement:

Interim restorations play vital roles not only in protection of pulpal and periodontal tissues but also in maintenance of biomechanical function and esthetic. The accuracy of interim crown fabricated by 3D Printing has not been revealed.

Purpose:

The purpose of this study was to evaluate the fit accuracy of interim crowns fabricated by photopolymer jetting (PolyJet) 3D Printing, comparing with that of milling and conventional methods.

Methods:

Twelve study casts with a prepared first molar were made by taking impression of a metal master cast. On the each study cast, interim crowns were fabricated by using conventional, milling and 3D printing methods (N=36, n=12). Conventional group used the over-impression technique. Milling group used a 5-axis dental milling machine, and 3D Printing group used a PolyJet 3D printer. The fit accuracy of interim crowns were evaluated in the proximal, marginal, axial and occlusal regions using the image-superimposition and the silicone replica techniques. Mann-Whitney U test and Kruskal Wallis test were used to compare results among groups (α =.05).

Results:

The milling and 3D Printing groups showed more accurate results than the conventional group in the proximal and margin regions (P<.001). In the axial regions, even though the mean gap was smallest in the conventional group, the data showed large deviations. In the occlusal region, the 3D Printing group was the most accurate, and the milling group showed large cementation gap compared to the other groups (P<.001).

Conclusions The PolyJet 3D Printing technology significantly enhanced the fit accuracy of interim crowns, particularly in the occlusal region.

Code SP15

Persistent Idiopathic Facial Pain Following Implant Placement - A Case Series

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Dental implants have progressively become more widely utilised in the rehabilitation of edentulous spans over recent years. Some studies suggest that up to 1% of the UK population may have at least 1 dental implant [HSCIC 2011]. This progressive increase has been mirrored by an increasing awareness of the advantages, disadvantages and processes involved in placing and management dental implants. An example of this includes the appropriate utilisation of more advanced radiographic techniques to identify and avoid vital structures when planning and undertaking surgery. When correctly planned, placed and utilised dental implants have the potential to significantly improve oral health related quality of life (OHR-QoL).

Common risks or complications include infection, failure of osteointegration, short-term post-surgical pain and the risks associated with trauma to vital structures (i.e. post-operative bleed or symptoms associated with nerve injury). Risks associated with placement in the mandible and posterior maxilla are well covered in the literature. Potential risks associated with implant placement in the anterior maxilla are, however, less well investigated. There is nonetheless limited evidence of chronic idiopathic pain following implant placement. This condition is considered to be characterised by the patient reported experience of long-term persistent and chronic pain within the region of implant placement which begins after implant placement and for which no organic cause can be found. It can involve a small or large region and unpredictable responds to implant removal or to pharmacological treatments. It may present with a wide gamut of pain characters [Renton *et al.* 2016].

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Chronic idiopathic post-surgical neuropathic pain is considered to be association with numerous medical procedures such as limb amputation. It is considered a rare complication of some dental procedures including dental extractions and endodontic procedures (both orthograde and retrograde).

Chronic idiopathic pain after dental implant placement is poorly understood and uncommonly reported, and is therefore considered to be rare. It is particularly poorly reported in the literature with only one other published case series [Renton *et al*. 2016]. Furthermore, apparent pain without an identifiable organic cause can be difficult to predict and exceedingly difficult to treat. Despite being rare the potential impact of chronic idiopathic pain on the OHR-QoL is significant. Further awareness and investigation of this is therefore pertinent to promote optimal and appropriate patient management.

This retrospective case series reports on cases seen at the Leeds Dental Institute Restorative Dentistry and Oral Medicine clinics and attempts to build on the limited pre-existing literature to support further characterisation of this sequalae following dental implant placement in the anterior maxilla.

Code SP16

Accuracy of a Novel Stereo Photographic Technique for Recording Protrusive Bite Registrations

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Background:

The outcome of restorative treatment is highly dependent on the occlusion of the restoration when treatment is complete.[1] Thus, an accurate, detailed record of the patient's occlusal scheme and mandibular movements is paramount to prosthodontic success.

Historically there have been many attempts to record mandibular movements. Protrusive bite records,[2] axiography,[2] ultra-sound,[3] accelerometers[4] and videofluroscopy[5] have all been implemented with varying, unpredictable and unreliable results. Physical bite registrations have long been known to impart inaccuracies for intercuspal bite registrations[6], and their use in recording centric or latero-protrusive positions (for example, to programme an articulator) have consistently been shown to have a repeatability in the range of 0.3mm or worse.[7-10]

Current optoelectronic methods of analysing interocclusal relationships are notoriously expensive, large, difficult to use and some require the use of anti-reflection powder.[4,11] None of these are amenable to application within a general dental practice setting.

There is a need for a reliable, accurate method of recording jaw relationships in function. A simple, low cost approach using stereo digital images is presented in vitro, and its trueness and precision assessed.

Method:

Dental stone study models (created by alginate impression) of upper and lower fully dentate arches were mounted in an anatomical relationship on a linear XYZ stage, after 3D scanning in a dental model scanner (Rexcan DS2, Europac, UK). The linear XYZ stage system allowed precise movement of the mandibular cast relative to the fixed maxillary cast, using a 1µm increment control.

Two machine vision cameras (uEye UI-1340LE-M, IDS Imaging, Obersulm) were mounted on an aluminium bar to create a stereo vision system and calibrated using a chrome glass mask, with a tolerance of 0.8µm (Micro Lithography Services Ltd, Chelmsford, UK). Sequential 'optical jaw relationships' were recorded throughout a simulated left lateral excursive movement. 10 stereo images per 200µm increment of the X-stage were captured, totalling 2mm of excursive movement (110 images in total, starting at zero displacement and moving to 2mm). At each 200µm increment, point of view was altered slightly, to simulate freehand camera positioning.

Custom software was written to digitally align the stereo images with the 3D models and quantify movement of the lower arch relative to the maxillary arch. For each group of 10, the 4 greatest outlying registrations were rejected and the remaining 6 were used for analysis. Trueness was investigated by measuring the mean displacement of three key points individually (lower left and right second molars, and lower right incisor) compared to the expected displacement of each tooth. Precision was assessed as the standard deviation of the mean displacement.

Results:

The mean trueness of interocclusal registration was always <25µm, and the mean precision was consistently <90µm, regardless of whether measurements were taken from the incisor movements or the molar movements.

The trueness of interocclusal registration was 21 µm.

The precision of movements of LR7, LL7 and LR1 teeth were 86µm, 78µm and 65µm respectively.

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Conclusion:

A simple, non-invasive optical technique for recording protrusive jaw registrations is presented.

The method shows good trueness (<25µm) and precision (<90µm), and could readily be applied in the general dental setting at very low cost, pending development of a simple user interface.

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Quality of Full Veneer Metal-Ceramic Crown Preparations Completed By Undergraduate Dental Students at the Cardiff Dental Hospital - A Retrospective Audit

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Introduction:

Undergraduate students at the Cardiff Dental Hospital are taught teeth prepared for full veneer metal-ceramic crowns (MCC's) should have an Angle of Convergence (AOC) of 6-15^{o} with no undercuts, a 1.2-1.5mm buccal shoulder margin and a 0.5-1.0mm lingual chamfer margin. Additionally, occlusal preparation should be completed in a planar manner with the functioning cusp bevelled, sharp edges rounded and reductions of 1.5-2.0mm and 1.0-1.5mm on the functioning and non-functioning cusps respectively. This audit was conducted to evaluate the compliance to these evidence based guidelines which promote tooth conservation, resistance and retention, structural durability and marginal integrity.

Methods:

100 stone dies of teeth prepared for full veneer MCC's were analysed against 11 criteria. For AOC, a standardised buccal & mesial digital photograph was taken of each die when mounted onto a custom silicone jig. ImageJ software was then used to calculate the average Mesio-Distal (MD), Buccal-Lingual (BL) and overall AOC. Margin depth was measured using a digital calliper and was considered to be the difference in distance between the outer and inner most edge of the margin. Three reading were taken mesio-buccally, mid-buccally, disto-buccally, mesio-lingually, mid-lingually and disto-lingually and then averaged to give the overall buccal and lingual margin depth. A silicone index was used to measure the occlusal clearance of functioning and non-functioning cusps. Each die was visually inspected for a buccal shoulder, lingual chamfer, functional cusp bevel, undercuts, rounded edges and occlusal planar reduction. Statistical analysis was carried out at a 5% level of confidence using t-tests and analysis of variance (ANOVA). Preparations were deemed acceptable if they met 80% of the criteria.

Results:

Only 22% (n=22) of preparations met at least 80% of the criteria. Dies were often over-tapered with 31.0% (n=31) compliance to the recommended AOC. The average AOC was 21.3^{O}±9.41, with 21.3^{O}±11.73 in the BL & 21.2^{O}±12.48 in the MD plane ($p>0.05$). Molars (28.6^{O}±5.52) were significantly the most tapered ($p<0.001$) followed by Premolars (20.32^{O}±7.60), Canines (19.4^{O}±6.37) & Incisors (17.0^{O}±9.62). Additionally, mandibular preparations (28.8^{O}±13.76) had a statistically greater AOC ($p<0.05$) than those in the maxilla (21.7^{O}±10.08) and undercuts were present in 18.0% (n=18) of dies. 90% (n=90) of buccal margins were shoulders and 70% (n=70) of lingual margins were chamfers as recommended. Margin depth compliance lingually (0.6mm±0.31) was 62% (n=62) and buccally (0.9mm±0.29) was 17% (n=17). The least compliance (17%/n=17) was observed in the mid-buccal area of the margin (0.9mm±0.39). Adequate occlusal clearance was achieved in 68% (n=68) of preparations with an average reduction of 1.7mm±1.20 in anterior teeth, and 2.3mm±1.55 and 3.0mm±1.64 in the functioning and non-functioning cusps of posterior teeth. Planar reduction was observed in 49% (n=49), rounded edges in 59% (n=59) and a functional bevel in 48.4% (n=31) of the 64 posterior teeth.

Conclusion:

The findings of this audit are consistent with other studies and demonstrate undergraduate MCC preparations often do not meet the recommended criteria. A substantial proportion of preparations are over-tapered, buccal margins underprepared and the occlusal surface lacks a functional bevel, smooth edges and planar reduction.

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