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Editorial

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DENTAL ASSOCIATION OF MALTA
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By Dr David Muscat

Dear colleagues,

2016 promises to be an exciting year with the DAM CPD events we are organising. We have a very good team with people in our committee who are committed and hard working.

We have successfully sent a group of dentists to Italy for ten days for postgraduate education and we are planning our next projects.

The events we have lined up so far are listed on the right.

Also radiology lecture and Innovations in dentistry lectures coming up.

CPD credits will be given at our events.

The photo on the cover is by Dr Etienne Cassar – entitled 'Selmun.'

Best regards,

David

Dr David Muscat B.D.S. (LON)
Editor / President, P.R.O. D.A.M.

RECENT/PLANNED EVENTS

30 MARCH
Dr Julianne Cassar Demajo – lecture on 'Law and Ethics' with dinner at Aqua in Portomaso sponsored by Prohealth.

8 APRIL
Mr Alex Manche Cardiothoracic surgeon-lecture ' A Bullet in the Heart' with dinner at Corinthia Palace Attard sponsored by Keral

6 MAY
Endodontics evening lecture by Dr Vipul Specialist endodontist in UK lecture sponsored by A1Pharma followed by dinner

7 MAY
Full day Endodontics course by Dr Vipul at Hilton sponsored by Bart Enterprises.

JULY
Lecture on Disinfection

SEPTEMBER
Lecture on Medical emergencies by Dr Adam Bartolo

The DAM Christmas Party 2015: More photos on pages 20 and 21

THE DENTAL ASSOCIATION OF MALTA
Administrative Report 2016 AGM

By Dr David Muscat, President – DAM

2015 has been a productive and rewarding year. We have achieved a great deal.

CONTINUING PROFESSIONAL EDUCATION
We have organised several lectures and events in conjunction with our sponsors. We have secured EU funds to send several of our members to Italy for postgraduate experience in top Rome clinics. This is the KA1 scheme. We are currently working on the KA2 scheme.

We have organised a hands on Occlusion course with Professor Brian Millar from Kings. This was highly successful and fully subscribed. We are working on a hands on Endodontics course planned for this year 2016.

DRAFT REGULATIONS FOR DENTAL CLINICS
We have taken note of our members feedback and are engaging in talks with the relevant authorities.

TOOTH WHITENING CLINICS
We have worked tirelessly on this and hopefully non dentists will be soon banned from carrying out this procedure.

CPD PROVISION AND ACCREDITIATION
Work is well in progress.

The DAM is a major service provider. Drs Ann Meli Attard and Gabrielle Cordina are co-ordinating this.

LIFE SAVING COURSES
Are carried out from time to time – sometimes for large practices also if requested.

CHRISTMAS PARTY
Organised successfully for the first time at Portomaso Quarterdack Bar with 558 euro raised for Inspire Charity.

Dr Lino said is being co-opted back into the committee as cultural and spiritual co-ordinator.

THE DENTAL ASSOCIATION OF MALTA
International Relations Officer Report 2015

By Dr Audrey Camilleri, IRO – DAM

In 2015 I attended 2 CED meetings – on in Riga Latvia in May 2015 and in Brussels in Nov 2015. At the meeting in Latvia I confirmed that the Dental Association of Malta will be hosting the CED May meeting.

Organisation is currently underway and we anticipate to host a successful meeting for about 140 participants.

AGREEMENT REACHED ON NEW EU DATA PROTECTION LEGISLATION
On 15 December, European institutions concluded years-long negotiations on the new EU General Data Protection Regulation. The Regulation will replace existing legislation from 1995 and aims to harmonise data protection across the EU.
New rules are expected to be in place from early 2018.
Dentists will be affected by the new legislation in their daily work. Specifically, the legislation will define the requirements for patients' consent for processing their personal data, the right of patients to ask for their information to be erased, and the modalities for ensuring that data is safely stored.

CED Office and relevant CED working bodies will analyse the legislation and provide further information to our members.

PROFESSIONAL QUALIFICATIONS DIRECTIVE
Mr Martin Frohn, Head of Unit Professional Qualifications and Skills from the European Commission's Directorate General Internal Market, Industry, Entrepreneurship and SMEs addressed the meeting on the changes resulting from the revised Professional Qualifications Directive which has to be transposed in national legislation by 18 January 2016.

He noted that the introduction of the European Professional Card and of the alert mechanism signal a new era in cooperation between Member States on recognition of professional qualifications.

Mr Frohn also updated the delegates in the current status of the mutual evaluation and transparency exercise under which national regulations of several professions have been examined, including those of dental hygienists for which no correlation between state of oral health and national regulation/responsibilities of the profession has been established.

Continues on page 6.

THE DAM PRESENTS A CHEQUE TO INSPIRE

Dr Noel Manche, Treasurer of the Dental Association of Malta presents a cheque for 558 euro to Ms Claire Galea from Inspire in the presence of Dr David Muscat President DAM and Dr Ann Meli Attard DAM CPD officer. The funds were raised at the Dam Christmas Party Charity raffle which has become a regular event.

We would like to thank our sponsors for helping us with the party and the raffle- Bart Enterprises, Cherubino, VJ Salomone, VJ Salomone(Pharma),GSK, A1Pharma, Page Technology, Collis Williams, Alfred Gera and Sons, Dr Noel Manche(painting), Hilton Portomaso(weekend break), A and V Von Brockdorff, Metropolis Pharma, Pro Health.

The event was organised by Drs Noel Manche and Ann Meli Attard. Raffle presents were organised by Dr David Muscat. The whole committee rallied round to make this a success.

THE DENTAL ASSOCIATION OF MALTA
International Relations Officer Report 2015

Continues from page 5.

He also acknowledged the decision not to introduce periodontology as a new automatically recognized dental specialty since the threshold of a specialty exisiting in 2 /5ths of member states was not reached

COOPERATION WITH ECDC
CED members unanimously adopted a renewed mandate of the Working Group Infection Control and Waste Management.

The revised mandate forsees enhanced cooperation with the European Centre for Disease Prevention and Control (ECDC). This will include the development of a webpage for ECDC website which would gather links to existing national guidance on infection control in dentistry.

USE OF AMALGAM SEPARATORS AND ENCAPSULATED AMALGAM
Members of the CED also unanimously adopted a revised mandate of the Working Group Amalgam and Other Restorative Materials. As part of the new mandate the Working Group recommended the use of amalgam separators and of encapsulated amalgam to mitigate the environmental impact of continued use of amalgam in dentistry.

TOOTH WHITENING FOR YOUNG PATIENTS
A renewed mandate of the CED Working Group Tooth Whitening Products was unanimously adopted by the CED plenary.

The Working Group will gather, in cooperation with relevant organisations such as the European Academy of Paediatric Dentistry scientific evidence on the safety of use of hydrogen peroxide to whiten the teeth of children and young people under the age of 18 which is currently prohibited under EU legislation but can be medically justified in certain cases.

If anyone has any queries regarding this report or any EU matters affecting dentistry please feel free to contact me on iro@dam.com.mt

CLINICAL TECHNIQUES AND RELATED COMPLICATIONS INVOLVED IN THE PROVISION OF FIXED IMPLANT SUPPORTED PROSTHESES

By Dr Peter Borg BChD MSc.

A steady increase in the number of patients and dentists aware of the biological, functional and social benefits of implant treatment has led to an ever increasing section of the population seeking dental implant rehabilitation for partial or full edentulism (Jokstad et al. 2003).

Recent developments in implant dentistry mean that results are often predictable with many studies quoting high survival rates for fixed prostheses after 10 years follow-up (Kreissl et al. 2007). Although survival rates are high, complication free survival rates are an altogether different matter.

Complications may arise due to implant specific and patient specific variables (Kinsel and Lin 2009) and may arise at any point during the procedure and likewise each step of the process is important in preventing such complications from occurring. It is up to the operator's expertise to manage and when possible avoid such complications.

If care is taken during the construction phase of the fixed implant prosthesis complications can be prevented later on during delivery and function. Prosthesis construction takes place on the definitive cast, the accuracy of which is determined by the accuracy of the impression, therefore, the more accurate the impression the more accurate the cast and this ultimately means less chance of having a misfitting restoration with eventual mechanical and biological complications.

Impression accuracy is dependent on a number of factors including: impression material and technique, implant number and angulation, ridge morphology and operator skill. A systematic review by Lee et al. (2008) found that the less angulated the implants the more accurate the impression, however impression material, whether polyvinylsiloxane or polyether had no significant bearing on the accuracy of the impression.

The literature review found that out of 14 studies examined 5 advocated better accuracy with pick up impression techniques and 2 with transfer impression techniques, 7 studies found no difference between the two methods. The difference in accuracy between the two techniques was more significant when a larger number of implants needed to be recorded in the same impression (Lee at al. 2008). The same literature review also found that more recent studies advocate splinting impression copings before impression taking to increase impression accuracy.

Choosing the right abutment plays an important role in preventing possible complications. Titanium abutments have been seen as the gold standard for implant retained restorations over the years however recent developments in ceramics mean that zirconium abutments are showing similar success rates over 3 year follow-up (Glauser et al. 2004; Zembic et al. 2009).

Despite these results ceramics are susceptible to age related deterioration of physical properties and may not be as reliable in the long term (Zembic et al. 2009). Although limited by their physical properties Zirconium abutments show better aesthetic properties (Belser et al. 2004) and may avoid aesthetic complications during fitting and function of the restoration.

Another important feature of the selected abutment is the presence of an adequate antirotational implant abutment interface and the application of the correct torque to secure the abutment.

In this way abutment screw loosening should be a rare event regardless of the geometry of the implant abutment connection (Theoharidou et al. 2008).

Ultimately the makeup and design of the single crown or framework determine the strength and durability of the fixed prosthesis. Metal-ceramic prosthesis exhibit the lower rate of complications compared to gold-acrylic fixed partial dentures. A systematic review by Pjetursson et al. (2004) found that gold-acrylic fixed partial dentures had a failure rate of 9.6% over 5 years compared to 3.4% for metal-ceramic prostheses.

In the case of single crowns one systematic review found that after 5 years the survival rate for metal–ceramic crowns was 95.4 and 91.2% for all ceramic crowns (Jung et al. 2008).

Similarly framework design has a heavy influence on the amount of future complications. Cantilevered bridges show the lowest incidence of event free survival, followed by single crown, splinted crowns and fixed partial dentures with one study quoting values of 68.6%, 77.6%, 86.1% and 100% respectively (Kreissl et al. 2007).

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CLINICAL TECHNIQUES AND RELATED CO MPLICATIONS INVOLVED IN THE PROVISION OF FIXED IMPLANT SUPPO RTED PROSTHESES

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These values are in turn affected by patient dependent variable, for example in bruxists where the chance of porcelain fracture increases by a factor of almost 4 (Kinsel and Lin 2005). In such high risk patients and effort should be made to avoid cantilevered bridges or extensions in the prosthesis design.

Another important consideration during prostheses construction is occlusion which is often regarded as one of the main causes for prostheses' failure (Kim et al. 2005).

Poor occlusion can lead to mechanical complications including screw loosening, screw fracture, prosthesis fracture and even implant fracture. Occlusal problems are more severe in implant prostheses rather than in natural tooth prostheses due to the lack of a periodontal ligament and therefore proprioception in implants. This translates to a mean tactile threshold value 8.75 times higher for implants than for natural teeth (Hammerle et al. 1995). To avoid occlusal problems it is suggested that prosthetic teeth are set up:

In balanced occlusion if the opposing dentition is a complete denture or group function if the opposing dentition in natural (Kim et al. 2005). With incisal guidance on healthy natural teeth where possible (Chapman, 1989). With wide freedom of movement in centric and intercuspation to prevent premature contacts. (Weinberg, 1998). Without working and non working side interferences.

In compromised situations, where implant and patient factors may be unfavourable it may be advised to use a narrow buccolingual occlusal dimension for the prostheses (Morneburg and Proschel, 2003) and construct the prostheses with reduced cusp inclines (Weinberg, 1998).

In such patients it is also suggested to axially load the implants which may require posterior crossbites due to palatal maxillary resorption. Surgical techniques to help deal with occlusal forces include having the implants placed in a tripod fashion and reducing the distance between posterior implants (Belser et al. 2000) as well as placing the implants vertically and parallel. Once in place the restoration should not occlude when the patient bites lightly and occlude gently when the patient bites forcefully. When the prosthesis is delivered a number of complications may be detected. Before fitting, the operator should examine the prosthesis extra orally.

If the prosthesis was not made as asked for on the lab ticket or defects are noted in the material a remake might need to be fabricated. The prosthesis should then be fitted intra orally. The framework should fit passively onto the implants avoiding any strain in the material.

For fixed partial dentures or single crowns the contact points must be checked. Loose contact points will require the ceramist to adjust the prosthesis tight contacts can be adjusted chair-side. All these complications should be avoided using the correct impression techniques and good communication with the technician.

Poor aesthetics may also cause problems during the delivery appointment. One systematic review showed that the "cumulative rate of crowns having unacceptable or semi-optimal esthetic appearance was 8.7%" (Jung et al. 2008). Poor aesthetics may be due to gingival factors or crown factors.

Any predictable aesthetics problems should be explained to the patient before treatment is undertaken, in this way the patient's expectations are kept realistic. If the aesthetics are poor due to manufacturing errors involving shape, size, angulation and shade of the prosthesis adjustments or a remake may be necessary. Good communication including clinical photographs and detailed explanations on the lab ticket may help avoid these problems. If necessary and possible the technician should see the patient to evaluate the site clinically.

The prosthesis should be produced with hygiene in mind. Following fitting the dentist should demonstrate to the patient how to clean the new teeth. If the dentist notices limitations in the potential for proper hygiene the prosthesis should be adjusted in order to avoid future complications.

Before securing the prosthesis into place the dentist should try in the prosthesis noting any irritation of the peri-implant mucosa which may require easing of the prosthesis or allowing the gingival to settle before finally securing the restoration. The dentist should also check the occlusion to verify that prosthetic teeth occlude in harmony with the opposing dentition in the way that was planned beforehand.

Whether screw retained or cement retained the dentist must pay attention to prevent complications. Cement retained restorations must have excess cement removed to prevent any of it seating in the mucosal col. To prevent excess cement flowing subgingivally the dentist may place the cement in the restoration seat it on the model remove the excess from the model then seat the prosthesis definitely in the mouth. Despite the possibility that cement retained crowns and related excess cement may propagate peri-implant complications a systematic review by Jung et al. (2008) showed that type of crown design, whether screw-retained or cemented, did not have an influence on biological complications.

Screw-retained prosthesis must have components screwed to the correct torque according to manufacturer recommendations with a torque gauge. Failure to do so may lead to screw loosening or screw fracture.

Over time a number of complications may results due to function. Such complications may include, screw loosening or fracture, debonding of cemented crowns, biological complications, veneer or framework fracture and implant fracture.

Screw loosening is the most common complication and in one systematic review was found to occur in 6.7 percent of cases over 5 years (Kreissl et al. 2007). All cases were reported in single crowns or cantilevered bridges whilst none of the cases occurred in fixed partial dentures. Screw loosening may occur due to a number of factors including:

- Inadequate tightening torque.
- Inaccurate fit of the framework.
- Loss of preload.
- Occlusal overload.
- Implant design – generally internal hex designs are better.
- Screw design.

(Kreissl et al. 2007).

Cemented crowns may also become debonded. In the systematic review by Jung et al. (2008) 5.5% of single crowns became debonded after 5 years of function.

Less frequently the screw may fracture. This often results due to the same factors as screw loosening. The same critical review by Kreissl et al. (2007) showed that screw fractures occurred in 1% of cases over 5 years. Broken screws are more difficult to manage however many techniques exist to attempt removal of a fractured screw.

If the position of the fracture is coronal a narrow mosquito forceps can be used to unscrew the retained portion. If the retained portion is further apical an attempt may be made using anticlockwise rotation with a sharp dental probe. A small round bur can also be used in a reverse rotation at low speed to try rotate the screw outwards. If these techniques don't succeed a retrieval kit may be necessary. These systems use a motorized device so care must be taken not to damage the internal wall of the implant.

With function damage may also occur to the overlying prosthesis, either due to framework or veneer fracture.

Framework fracture is relatively rare with the review by Kreisssl et al. (2007) showing that around 1% of cases suffer framework fracture over 5 years. Veneer fractures occur more commonly, in around 5.7 % of cases over 5 years (Kreissl et al. 2007), however in this study 8 out of 10 fractures occurred in the same 2 cantilevered bridges.

The higher incidence of framework and veneer fracture in cantilevered bridges and bridges with extensions was confirmed in a study by Bragger et al. (2001). Once they occur veneer and framework complications are difficult to manage and usually involve remaking the prosthesis, it is therefore important that good design and lab work are employed from the start to prevent such complications occurring in the first place.

Implant fracture is another major complication that may occur. In the systematic review by Kreissl et al. (2007) 0.4% of implants fractured over 5 years and 1.8% after 10 years.

Fracture of an implant can undermine the whole treatment plan especially if the remaining implants fail to offer sufficient support for the current prosthesis. In these cases the fractured implant may have to be replaced and a new prosthesis made.

Proper function of the restoration may also be disrupted by biological complications including mucositis and peri-implantitis. Different authors use different criteria to measure such biological complications so a cumulative complication rate is difficult to determine.

In a systemic review by Pjetursson et al. (2004) peri-implantitis and soft tissue complications were found in 8.6% after 5 years. In a study by Bragger et al. (2005) 13 out of 65 implants restored with single crowns were diagnosed with peri-implant disease while 8 out of 69 implants restored with fixed partial dentures were reported to have peri-implant disease.

Management of such complications may involve simple oral hygiene instructions and patient motivation, mechanical debridement using curettes with or without antiseptics or antibiotics and surgical debridement and elimination of pockets.

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CLINICAL TECHNIQUES AND RELATED COMPLICATIONS INVOLVED IN THE PROVISION OF FIXED IMPLANT SUPPORTED PROSTHESES

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Biologocial complications may have severe consequences that may undermine treatment (Bragger et al. 2005).

Management is most often not simple and the best course of action is to prevent complications from occurring in the first place by choosing low risk patients compliant to clear maintenance instructions and regular review appointments and placing restorations that are easy to keep clean.

The indisputable advantages of implant borne restorations over their removable counterparts have led to a steadily increasing number of patients seeking such treatment (Jokstad et al. 2003).

To avoid a similar increase in complications practitioners must use implant systems and techniques that are tested scientifically and backed by independent studies and reviews.

Use of tested techniques and the continuous development of components will help keep the risk of complications low.

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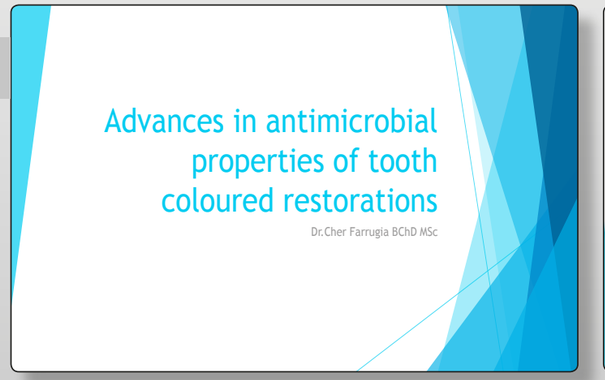
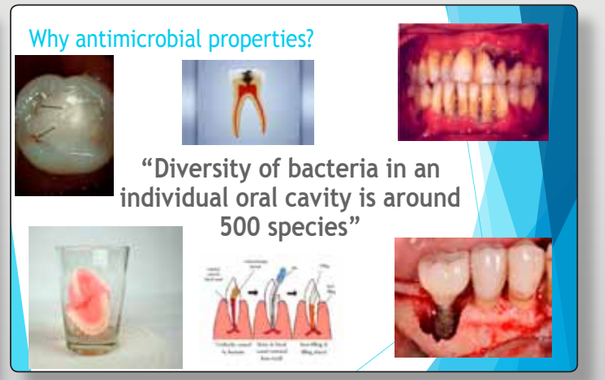
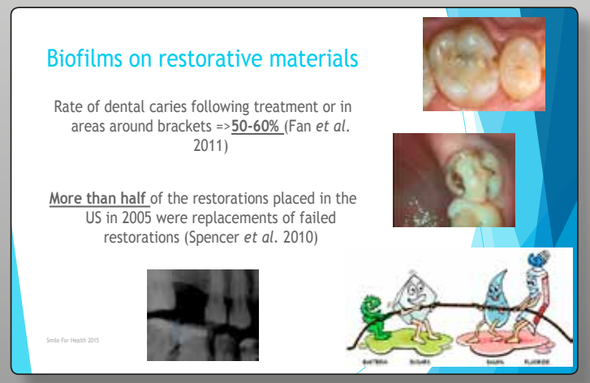
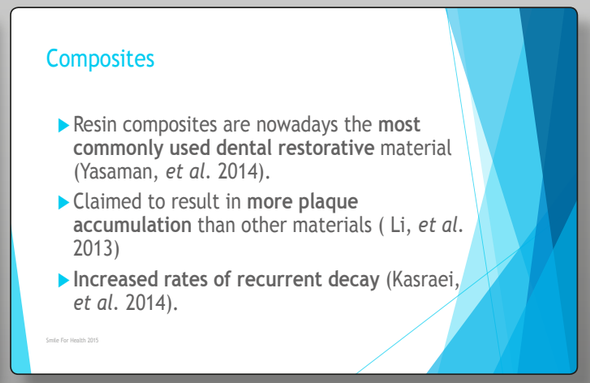
ADVANCES IN ANTIMICROBIAL PROPERTIES OF TOOTH COLOURED RESTORATIONS

The rate of dental caries following restorative treatment is claimed to reach values of up to 50-60%, with secondary caries being the main reason of failure of glass-ionomer cement (GIC) and composite resin restorations. Composites result in more plaque accumulation than other materials which may also be the cause of the increased rates of recurrent decay experienced with this material. Nonetheless resin composites are nowadays the most commonly used dental restorative material. The presentation will highlight the advantages of antimicrobial restorative materials and how this is being achieved in both commercial and test materials mentioned in the literature. Methodologies used in the literature to assess antimicrobial activity of dental materials vary significantly and there are no current standards for antimicrobial assessment of restorative materials, therefore the clinical relevance of claimed antimicrobial activity of such materials will also be discussed.









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ADVANCES IN ANTIMICROBIAL PROPERTIES OF TOOTH COLOURED RESTORATIONS

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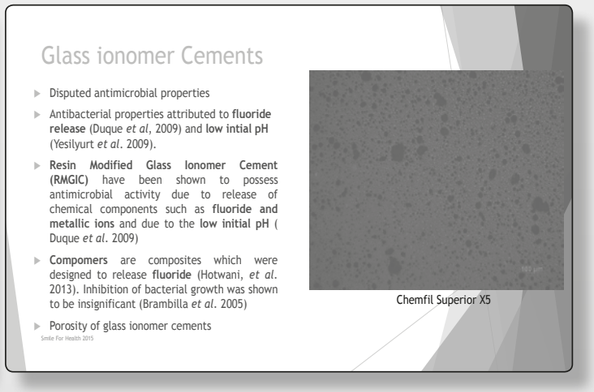

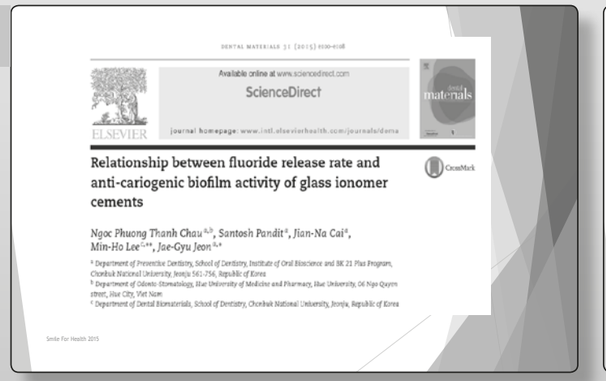

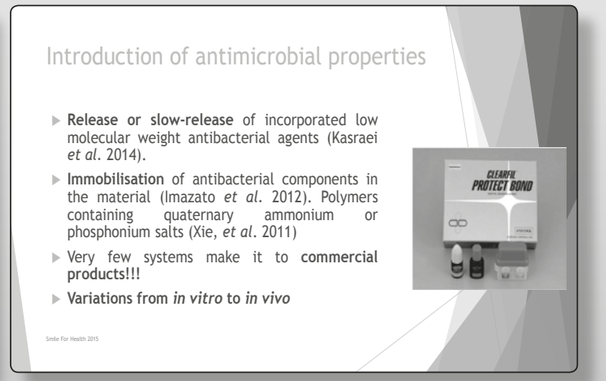

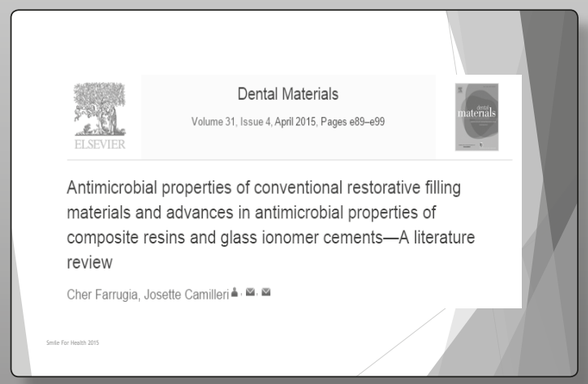

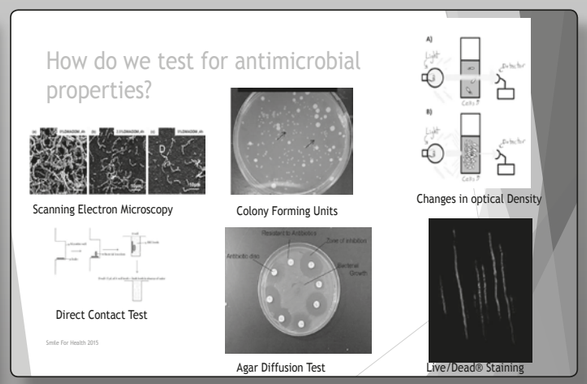

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ADVANCES IN ANTIMICROBIAL PROPERTIES OF TOOTH COLOURED RESTORATIONS

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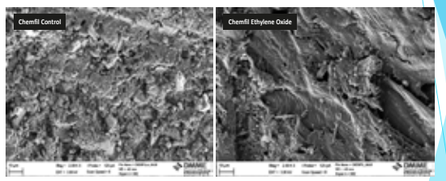
Variables

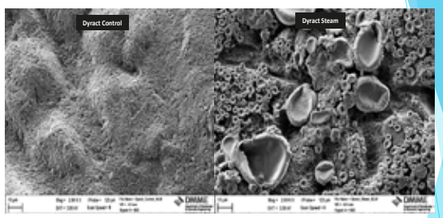
- Antimicrobial tests - NO STANDARDS!!
- Species
- Incubation conditions for the same species
- Single species
- Aging methods
- Sterilisation method prior to antimicrobial testing

Smile For Health 2015

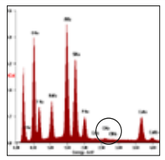
Assessment of material composition after sterilization - Scanning electron microscopy



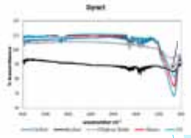
Ethylene oxide sterilization affected the microstructure of Chemfil, Ionoseal and Dyract



Steam sterilization caused changes to the surface of Dyract with a number of bubbles present on the material surface



Energy Dispersive Analysis
Ethylene oxide sterilization showed additional chlorine peak in Chemfil, and a calcium peak in Dyract



ATR-FTIR
Alcohol sterilization: flattening of the absorption bands in the 1400-1600 cm-1 region for Chemfil
Ethylene oxide: flattening of the Si-O stretching vibrations in the glass ionomer- based materials and had no effect on SDR

Microhardness Changes

Smile For Health 2015

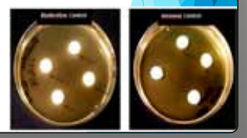
Effect of sterilization techniques prior to antimicrobial testing on physical properties of dental restorative materials

Cher Farrugia [1], Glenn Cassar [2], Vasilis Valdramidis [1], Josette Camilleri [1,*]

Smile For Health 2015

Effect of material properties on antimicrobial testing

- ANCOVA analysis of covariance
- Variable's relation to McFarland values
- **Variables:** pH, ageing, material, presence of elements
- **Higher turbidity:** Barium , Materials Ionoseal, Dyract and SDR, at 24-hour ageing
- The materials tested have shown **significant differences** between their **chemical components** and **physical properties**
- **Agar disk diffusion test:** Solubility or antibacterial properties? **Ionoseal and Biodentine**
- **Biofilm accumulation test:** Presence of **barium** when using materials **Ionoseal, Dyract and SDR** at the 24-hour ageing.
- **Barium in Ionoseal and SDR and Strontium in Dyract**



Smile For Health 2015

Continues on page 36.

THE DAM **CHRISTMAS PARTY 2015**

The party was held at the Quarterdeck Bar at the Hilton Hotel Portomaso on Friday 4th December 2015. This was a very smart, exceptionally excellent and well attended event. There was an abundance of high quality food with a Blue Elephant table, open bar, and waiters coming round constantly with canapes. The highlight of the evening of course was the traditional charity raffle. €558 was raised for Inspire this year.

Photos by Dr Gabrielle Cordina.

HYPODONTIA
THE PARTS AND THE WORKS

Audrey Pace
BChD MJDFRCS (Eng) MOrthRCS (Edin) Mphil (Orth) CCST UK
Specialist Orthodontist

Overview

- Background
- Quality of life
- Orthodontic management
- Conclusion

Background

Definition

Hypodontia

Congenital absence of one or more teeth

Oligodontia/ Severe hypodontia

Absence of many but not all teeth (> 6)

Anodontia

Congenital absence of all teeth in one or both dentitions

Classification

MILD 1-2 teeth missing

MODERATE 3-5 teeth missing

SEVERE 6 or more

Prevalence

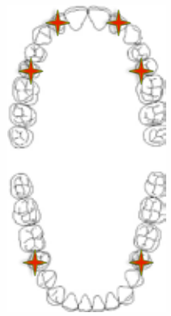
Primary dentition 0.5% to 0.9%

Secondary dentition 3.5% to 6% exc 8s*

F > M *

* Polder 2004

COMMON



LESS COMMON

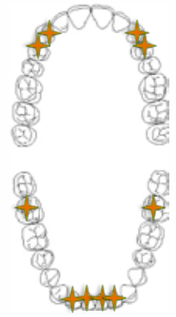


Table 4: *Percentage scores of individual malocclusion traits scored for in the Maltese IOTN*

Trait	Percent
Increased Overjets	21.13
Reverse Overjet	2.08
Crossbite	5.29
Deep Overbite	2.26
Open Bite	1.60
Scissor Bite	0.57
Mild Crowding	6.98
Moderate Crowding	14.91
Severe Crowding	12.64
Hypodontia	3.21
Impacted Teeth	12.07
Submerged Deciduous Teeth	1.89

* Camilleri S, Mulligan K. The Prevalence of malocclusion in Maltese schoolchildren as measured by the Index of Orthodontic Treatment Need. *Malta Medical Journal* 2007; Vol 19[1]: 19

QoL

How do we fare?

Aetiology

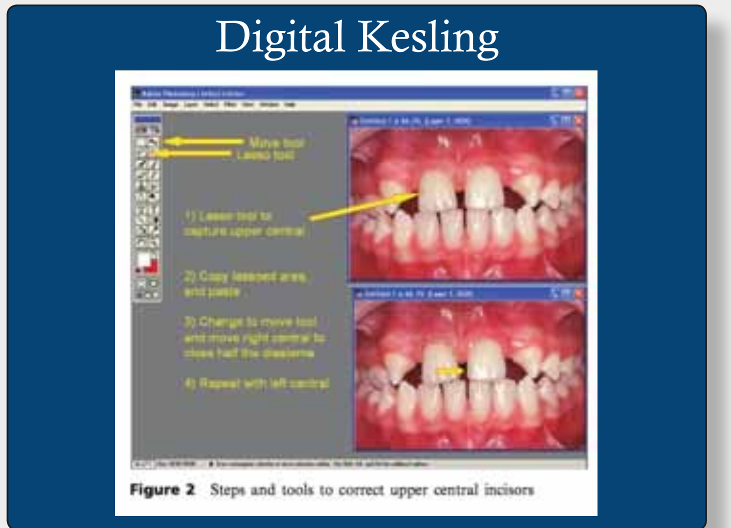
- Multifactorial
- Implicated genes
  - MSX-1
  - PAX 9
  - AXIN 2
- Consanguinity is a risk factor
- Syndromic /Non syndromic
- Associated syndromes
  - Ectodermal dysplasia
  - Down syndrome
  - Orofacial- digital
  - Ehlers Danlos
  - CLP

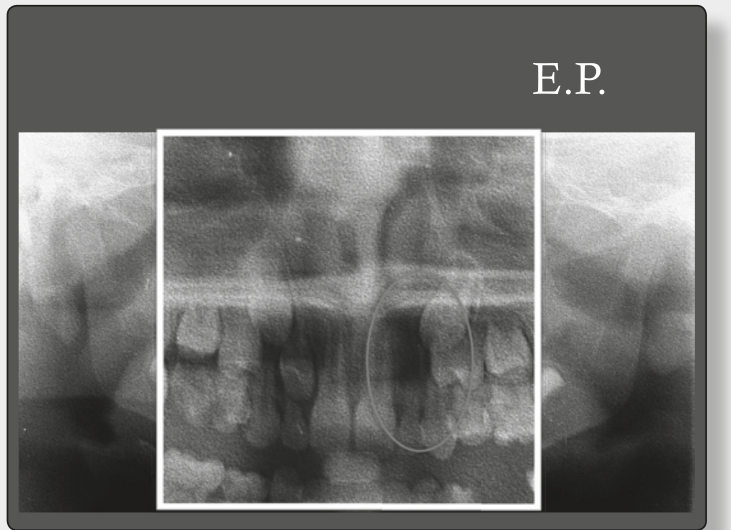
What about the patients?

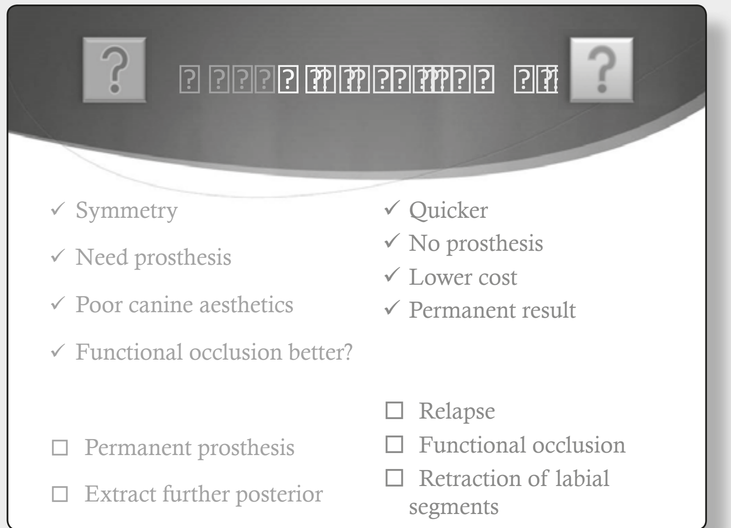
Continues on page 24.

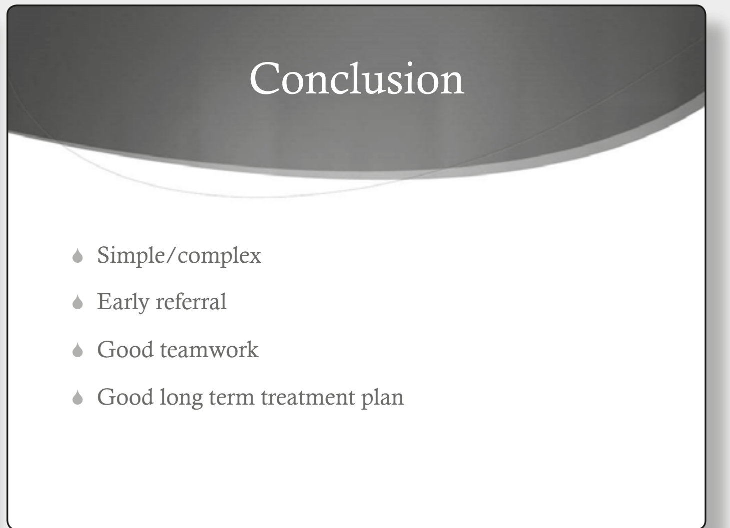
HYPODONTIA
THE PARTS AND THE WORKS

Continues from page 23.









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European jurisdiction: have you extended your policy to include European jurisdiction cover especially if your clients include European nationals?

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AN ULTRA-CONSERVATIVE APPROACH FOR RESTORING SEVERELY WORN TEETH DUE TO BRUXISM AND BULIMIA NERVOSA WITH DIRECT COMPOSITE: **A CASE REPORT**

By Piotr Strojek, BDS, MSc

ABSTRACT
Long lasting self-induced regurgitation of gastric acids in conjunction with bruxism can lead to severe tooth wear. Considering the fact the erosion of the hard tissues in the bulimia nervosa affects mostly young patients the treatment should be as conservative as possible. Restorations made with direct composite preserve remaining tooth structure, are relatively easy to place, predictable and aesthetic.

The presented case demonstrates a conservative approach for restoring the function and aesthetics of the affected dentition with minimal intervention.

Dr. Strojek qualified from the Medical University in Poznan in 1999 and followed his special interest in state of the art bonded restorative materials and techniques which resulted in him being awarded a Masters Degree in Aesthetic and Restorative Dentistry from the University of Manchester in 2013 and winning an award for The Best Complex Case of the year.

For more than 10 years, Piotr has worked in a number of high profile dental practices in London's City and the West alongside the world's leading clinicians like Koray Feran and David Klaff.

A self-described education junkie, Dr. Strojek has attended countless courses and conferences covering all aspects of restorative dentistry and implantology. He is a founder of the International Academy of Dental Arts, an educational body providing training on advanced techniques and materials of aesthetic dentistry. His work on minimally invasive bonded porcelain restorations was recognised and published online by the world renowned restorative group 'Style Italiano'.

INTRODUCTION

Advances in promotion of oral hygiene and preventive dentistry resulted in significant improvement of the overall caries and periodontal disease picture. Epidemiological data collected on regular basis in many European countries suggest a significant decline in prevalence of both diseases historically considered to be the major oral health burden. The tooth wear (and especially erosion-related wear) has joined the list and it has been recognised that it is becoming increasingly prevalent in the both young and aging population . Modern lifestyle has significantly contributed to increase in prevalence and incidence of psychosomatic eating disorders as well.

Young adults and children are particularly at a high risk . Bulimia nervosa is characterised by lack of ability to control voluntary food intake with subsequent compensatory mechanisms such as purging, fasting or vigorous exercise. Self-induced vomiting is the most common form of purging and it is responsible for the erosion of the tooth tissues. Almost 90% of patients suffering from bulimia nervosa are affected by erosive tooth wear.

TOOTH WEAR

Non-carious progressive loss of the hard tissues of the teeth is usually multifactorial. It is caused by combination of erosion, attrition and abrasion. Attrition, defined as loss of hard tooth tissue from occlusal contacts with an opposing dentition, may be accelerated by parafunctional habit of bruxism.

Loss of tooth structure due to non-bacterial chemical process is known as erosion. It occurs when teeth are exposed to acidic substances of intrinsic (gastric acid) or extrinsic origin (acidic drinks and food, some medications). The exposure to hydrogen ion attack lowers enamel microhardness and makes it more vulnerable to mechanical wear. In the case of bruxer patients who suffer from bulimia nervosa the progression of the destructive process may exceed the defensive response from the dentin-pulp complex and result in sensitivity, toothache and pulpal inflammation. Abrasion is the loss of the tooth tissue due to mechanical process but independent of occlusal contacts. Usually foreign objects are involved like toothbrush, toothpaste, nails. It is very challenging to diagnose the aetiology of the tooth wear judging only from the appearance and distribution of the lesions. Collection of the dental and medical history and detailed data regarding patient's diet, lifestyle, occupation and habits is necessary. In most of the cases all damaging factors are present with one or two of them being dominant. In bulimia nervosa palatal surfaces of maxillary anterior teeth are affected first.

Continues on page 30.

AN ULTRA-CONSERVATIVE APPROACH FOR RESTORING SEVERELY WORN TEETH DUE TO BRUXISM AND BULIMIA NERVOSA WITH DIRECT COMPOSITE: **A CASE REPORT**

Continues from page 29.

Initially enamel has a glossy, smooth appearance. Gradually anatomical features are disappearing and eventually dentine is exposed. Quite often a ring of enamel is preserved. Weakened, thinner enamel is more prone to wear. With the addition of accelerated attrition in bruxism damage to incisal edges of the anterior teeth may advance rapidly affecting occlusal stability, function and aesthetics .

DAHL'S PRINCIPLE

Despite of decreasing length due to wear, anterior teeth usually stay in contact. In the process of alveolar compensation soft tissues and a bone move towards the occlusion. Lack of space for restorations creates a significant challenge for the clinicians.

Until the 1970s the obvious way to create that space was further reduction of the tooth dimensions resulting in significant risk of pulpal damage. Dahl et alproposed alternative, more conservative approach. He used a custom made, removable anterior bite metal plane that did not allowed for posterior contacts. After several weeks/months of passive posterior eruption, anterior intrusion and alveolar compensation a posterior contact was re-established .

Nowadays, metal plate is replaced with direct or indirect restorations bonded to the front teeth but the principle remains. Advances in materials and adhesive techniques allowed for placement of the final restorations immediately at the increased vertical dimension shortening the treatment time.

CONSERVATIVE MANAGEMENT OF THE TOOTH WEAR IN BULIMIA NERVOSA

Thoughtful analysis of dietary habits, dental, medical and social histories combined with the results of clinical examination should help with establishing correct diagnosis. Once it is determined materials and methods of restoration are chosen accordingly. Preservation of the remaining tooth tissue during the reconstructing of the form and function of the teeth is crucial. Long term survival of the tooth is far more important than survival of the restoration as new materials are less expensive, easy to repair or replace.

Obviously, the treatment apart from being protective and ultraconservative, has to meet patient's aesthetic requirements. It is usually deteriorating appearance of the teeth that drives patients to seek professional help. The information about the cosmetic treatment options is easily available on the internet and in the media. Quite often patients know exactly what kind of treatment they want. It is our duty to present and explain the rationale behind protecting the remaining tooth tissue and avoiding unnecessary and destructive procedures.

In 2010 M.G Kelleher introduced 'The Daughter Test' as a guide for choosing the method for elective aesthetic treatments. He suggested that each time an elective treatment is planned the dentist should honestly answer the question: "Knowing what I know about dentistry and the effects of this elective treatment on the health and structure of these teeth in the long-term, would I carry out this treatment on my own daughter?" .

Prognosis of the dental treatment largely depends on controlling the eating disorder. Sincere discussion, presenting possible medical complications originating from long-term self-induced vomiting should help and encourage patient to look for medical and psychological help as well.

For a long term good prognosis the patient should follow strict dental protocol:

- Rigorous hygiene and home care.
- Regular professional dental cleanings
- In-office fluoride applications to prevent further erosion and decrease dentin sensitivity.
- Daily home application of fluoride in custom trays to promote remineralization of the enamel.
- Use of artificial saliva.
- Rinsing the mouth with water immediately after vomiting to decrease the acidity in the mouth.
- Use of a fluoride rinse to neutralize acids and protect and remineralize the tooth surfaces.
- Not to brush teeth immediately after vomiting, it will lead to excessive enamel erosion.
- Use desensitizing toothpaste to decrease dentinal sensitivity.

CASE REPORT

A 19 year old female patient was looking for a second opinion regarding the enormous sensitivity of her front teeth affecting her diet and whole lifestyle. Patient, surprisingly, did not report any aesthetic requirements – she was comfortable with the appearance of her teeth. She followed her father's advice to get a second opinion as the treatment plan she received for the first time involved crowning 6 upper front teeth. It seemed a bit harsh and financially unacceptable for the parent who agreed to cover the cost of the treatment.

Patient was generally in good health. Smoker: 5-10 cigarettes a day. Ordinary dietary habits. The sensitivity, as patient describes, 'was always there' but got worse during last two years. It reached the point where the patient began to avoid food and drinks – especially acidic ones. Patient was not aware of the night grinding or clenching.

During the clinical examination erosion of the palatal surfaces and incisal wear of the maxillary anterior teeth with no inter-occlusal space was discovered.

Before the treatment left, front and right views

Dahl beginning (left) and finished (right)

After the treatment left, front and right views

Exposed dentine was surrounded by a ring of enamel and had a smooth glassy appearance with no stains or lines. The tooth structure was missing not only where the teeth contact each other. Abnormally dry oral mucosa and chapped lips were present.

As part of the examination, radiographs, photographs (intraoral and extraoral), and diagnostic casts were obtained.

All the findings suggested the tooth wear was caused by acidic erosion of the intrinsic origin and increased attrition due to bruxism and excessive smoking. Patient being a young female belonged to the high risk group of bulimia.

When asked directly, the patient at first categorically denied having a problem with an eating disorder. It is not uncommon that patients withhold important information regarding their lifestyles and behaviour. In the presented case, as confirmed later by the patient herself, it was due to the presence of her father during the examination appointment.

Restoration of the form and function of the anterior maxillary teeth was planned with direct composite. This method guaranteed maximum preservation of the remaining teeth structure, good aesthetics and reasonable cost (quite important factor for the patient). The teeth were restored on the models first. Impressions of the wax ups were used for fabricating immediate mock up restorations. Length and shape of the teeth were agreed with the patient and her parents. Mock up restorations made from crown and bridge temporary material (Luxatemp, DMG) were left for 5 days.

During that time patient was able to try the new shape and check for any interferences with the lips or speech. After minimal corrections clear silicone index was fabricated (Clear Bite, Star VPS, Danville). Due to severe sensitivity local anaesthesia was used.

Teeth were isolated by placing rubber dam (OptraDam Plus - Ivoclar). Enamel that was to be covered with composite was cleaned and roughened by sandblasting with Microetcher II (Danville) using 50µ aluminium oxide powder and etched witch 38% phosphoric acid for 30 seconds. Exposed dentine was etched for 15 seconds and coated with Optibond FL Primer. The layer of bond was light cured after removal of the excess.

Using the transparent silicone template the palatal layer of composite was placed (HFO, Micerium). The shell of each tooth was created with GE2 enamel composite next. Layer by layer the whole tooth was recreated with dentine shades UD4, UD3.5, UD3.

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AN ULTRA-CONSERVATIVE APPROACH FOR RESTORING SEVERELY WORN TEETH DUE TO BRUXISM AND BULIMIA NERVOSA WITH DIRECT COMPOSITE: **A CASE REPORT**

Continues from page 31.

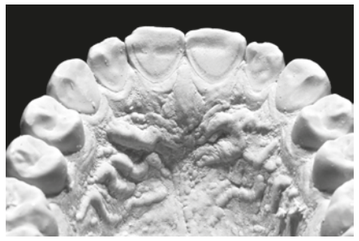
The material was applied with soft paintbrush. Each layer was separately light cured. The last layer was light cured and covered with glycerine to prevent developing oxygen inhibited formation which increases the stain susceptibility of the material. Sof-Lex™ discs were used for trimming. After creating surface texture the restorations were polished rubber cones.
Bite was raised and opened at the back according to Dahl's technique. Week later, during the review appointment composite was repolished. Patient did not report any issues with the new restorations. She felt comfortable with the open bite in the posterior region.

Patient was warned the restorations are more at risk of chipping and fractures during the time when there was no support from the molars and premolars. Occlusion was re-established just after 6 weeks! Patient was happy with the final result. Her main complaints – sensitivity and aesthetics were resolved. Restorations were almost 'invisible'. Margins perfectly blended with tooth's enamel.

Layered composite perfectly mimicked natural colours and transparencies. No tooth tissue was lost to the treatment. Occlusion was fully functional again. The dental part of the treatment was finished. The psychological, more important part remained.

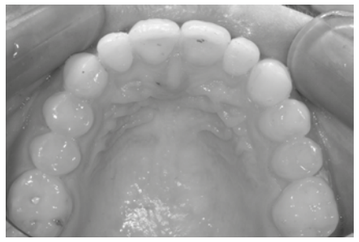
CONCLUSION

Dentists being the first medical professionals who can diagnose the disorder should be able not only to provide adequate treatment within the oral cavity but to inform the patients about the other potentially serious medical complications resulting from the condition, encouraging them to seek for medical or psychological help. It is possible to create the necessary space and restore the worn teeth in conservative and predictable way using Dahl's principle and direct composite restorations.

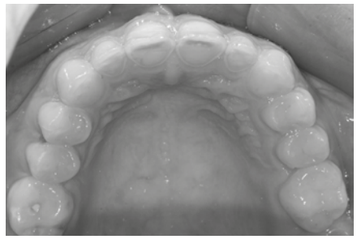


Erosion patterns on a stone model

Self-made waxups



Palatal buildups



Palatal wear

Smile with worn teeth and dry lips (before treatment)

Smile with restored teeth

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INTRAORAL SCANNERS

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Intraoral scanners are powerful devices which allow the dentist to take high-quality digital impressions and therefore to obtain 3D models of the patients' mouth using only a lightening source: this eliminates the discomfort and hassle of conventional impressions, resulting in a more time-efficient technique. A digital workflow improves the communication with the laboratory, saving money and time.

More important, patients prefere the digital impression technique rather than conventional techniques. In fact, digital impressions are more comfortable for the patient, thus they represent a powerful marketing tool, which may help clinicians to promote their business. Intraoral scanners are 3D scanners.

The 3D scan is a very complex process. Essentially, the 3D scanner projects a lightening source/ pattern (structured light or laser beam) on the object's surfaces, and it captures the light reflection with the help of several cameras.

The aforementioned reflection is used to calculate the coordinates of the object using a powerful 3D reconstruction software, which is able to generate point clouds and meshes.

Despite the complexity of such devices, it is indeed very simple to take a 3D impression: it is enough to introduce the scanner's tip into patient mouth and progressively move it above and around teeth. A last scan will be requested for the bite. Thanks to their simplicity and undeniable advantages, intraoral scanners start to spread all over dental practices and more and more dentists are asking for information.

At this point, it is recommended for the dentist to collect as much information as possible, in order to make a proper (informed) choice.

Which are the parameters to be taken into consideration before purchasing an intraoral scanner? In other words, are there any ideal characteristics an intraoral scanner should possess? We list here the basic and fundamental parameters:

- Accuracy, precision, resolution
- Clinical use
  - Need for opacization/ powdering (yes/ no)
  - Scan speed
  - Tip dimensions
  - Colour images yes/no
- Open/closed system
- Costs (price and licensing fees)

ACCURACY, PRECISION, RESOLUTION

First of all, an intraoral scanner should be able to obtain both an accurate and precise optical impression. These two words (accuracy and precision) are no synonymous, even though they are often mistaken one for another.

We are now referring to their mathematical meaning, which, in this case, determines the final quality of the impression. Mathematically, accuracy is defined as the ability of a measurement to match the actual value of the quantity being measured, while precision is defined as the ability of a measurement to be consistently repeated.

Ideally, an intraoral scanner should possess high accuracy (it should be capable to match reality as close as possible) but also high precision (it should be able to consistently replicate results, getting the same measurement each time).

The only way to calculate the accuracy of an intraoral scanner is to overlap its scans with a reference scan, obtained with a powerful industrial machine (industrial optical scanner, coordinate measuring machines): after the overlapping of these images/ models, specific softwares are able to generate a colorimetric map, displaying all the differences at a micro-metric level.

Precision can be calculated more easily, simply overlapping different scans/models taken with the same intraoral scanner at different times, and evaluating the differences at the micro-metric level.

It's easy to understand how important is for an intraoral scanner to be accurate and precise. Technically speaking, a scanner could be accurate but not precise, or vice versa. In both these cases the optical impressions would not be satisfactory: this would negatively affect the entire prosthetic workflow, where the reduction of the marginal gap is the prosthodontist's major task.

Unfortunately, we are facing a lack of information on accuracy and precision of intraoral scanners in the current scientific literature: only a few studies have dealt with this topic (1-5), therefore there is a need for specific research in this field.

It is important to underline that the software in use by the intraoral scanner is of paramount importance in determining the final accuracy and precision of the registered scans: this works on the 3D reconstruction of the scanned object, therefore it is key.

Finally, the resolution of the scanner is important too. Resolution is the fineness to which an instrument can be read. The resolution of a scanner is given by the cameras included in the devices: these are generally very powerful.

CLINICAL USE

Before to buy an intraoral scanner, these key factors related to the clinical use should be considered:

- does the scanner need opacization/ powdering before use?
- is the scanner fast enough?
- what are the dimensions of the tip/ tips?
- can we obtain in colour impressions?

The first scanners available in the market required opacization/ powdering before use: powder was requested to obtain a good impression.

However, the more recently introduced scanners work without using any kind of powder/ spray: this is important, as powdering is usually not appreciated by the patients. In addition, a uniform distribution of powder is difficult during opacization: any mistake during the application of powder (such as non-uniform application) may result in errors during impression taking (6).

Speed is important too, as it is always appreciated by the patients (7,8). It is important to have the possibility to perform our scans without any interruption, particularly in the case of full-arch scans. There are undeniable differences between the purchasable scanners out in the market, but what really matters is the learning curve.

A true discriminant when comparing different items is how much the dentist is confortable using them. Obviously every intraoral scanner possesses peculiar characteristics; however, literature on this topic is still scarce (9,10). The tip dimensions play a role with respect to the patient's comfort.

Especially in the posterior areas of jaws, and when the second/ third molars are scanned, a little tip should be recommended, in order to reduce patient's discomfort during the procedure.

However, it has been demonstrated that even using larger tips, excellent impressions in the posterior areas can be obtained; a larger tip can be useful to gently shift undesired tissues (cheeks, etc) and it could be extremely helpful when taking long-span scans, because it may improve the final accuracy/ precision of the scan (9,10).

Last but not least, modern intraoral scanner should provide in colour impressions. Only a few scanners now have in colour impressions. In colour images are not very important for the prosthetic planning, however they allow a better communication with the patient, and they represent a powerful marketing tool. In the next future, it is not unrealistic to consider the possibility that particular functions, such as colorimetric analysis, may be included into intraoral scanners.

OPEN AND CLOSED SYSTEMS

The output of a digital impression is usually a legally valid file (a proprietary file), provided by the scanner's producer, or a free solid-to-layer (STL) file. STL files can be immediately opened (and used) in any computerassisted-design (CAD) software, with no need to purchase CAD licenses or to unlock files paying fees. Several purchasable scanners provide such free technology, as they have STL files as output: these systems are therefore called "open systems".

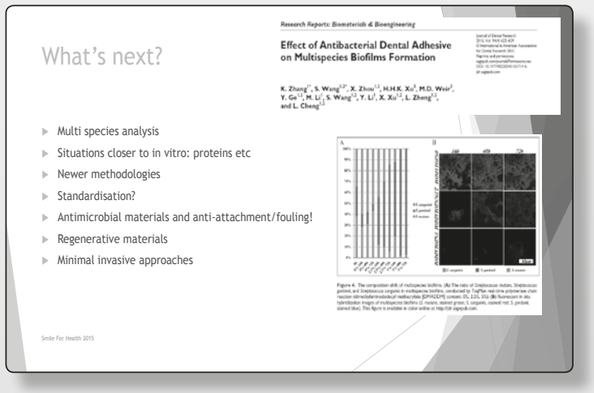
Open systems increase the collaboration between dentists and laboratories: in fact, there's no need to convert files and these can be opened in all CAD softwares. Finally, the milling process can be realized virtually with all milling machines, without any limitation.

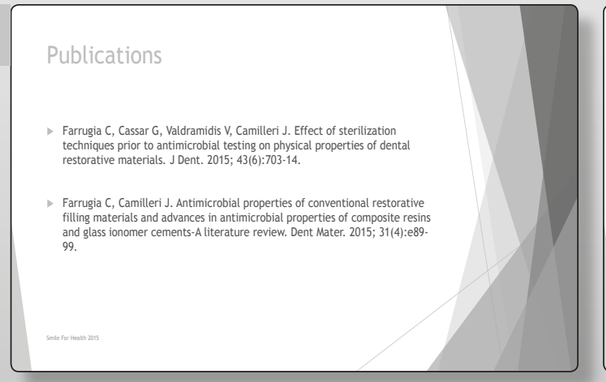
Open systems provide economic advantages, saving money and time; however, combining technologies provided by different manufacturers and Companies may be difficult for the dentist, especially at the beginning, therefore closed systems may help.

Continues on page 37.

ADVANCES IN ANTIMICROBIAL PROPERTIES OF TOOTH COLOURED RESTORATIONS

Continues from page 18.





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INTRAORAL SCANNERS

Continues from page 35.

When we refer to a "closed system" we mean that all files obtained through the digital impression can be opened and processed only in a proprietary CAD software.

Obviously, this limitation should be considered before to purchase a scanner. In this context, in fact, it is not possible to freely obtain and use STL files; in some istances, for the conversion of the proprietary files into STL, the payment of a fee may be requested by the Company.

However, there are also clear advantages related to closed systems. For example, if the users are still not experienced in the digital technologies, an integrated closed system may help them with the learning curve.

Moreover, some closed systems are complete, because they have integrated milling machines: from the impression to the CAD modelling and the milling of a restoration, a complete "in office" digital workflow can be provided. This represents a clear benefit for the patient (9,10).

COSTS

Purchasing an intraoral scanner is still a consistent investment; moreover, some scanners require payment of annual licensing fees. The only way to amortise this investment is to use the scanner every day, in different fields of dentistry. Nowadays the major applications of intraoral scanners are in the prosthetic field, with digital impressions used to realize several CAD/ CAM recostructions (inlays, onlays, single crowns, fixed partial prostheses supported by natural teeth or implants).

However, intraoral digital impressions can be combined with cone beam computed tomography (CBCT) images, for the preparation of surgical stents in guided implant surgery, and also in the orthodontic field, for the design and manufacture of a series of different personalized devices.

In the next few years, the informations acquired through intraoral scanners will be combined also with the ones coming from face scanners, in order to realize the "virtual patient": all tissues (teeth, gingiva, bone, skin) will be overlayed and this will help the dentist to better plan surgical, prosthetic or orthodontic treatments.

In this context, informations coming from the virtual facebow should be integrated, in order to obtain a virtual articulator.

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THE DAM 2015
ST APOLLONIA EVENT

This event was organised by Dr Lino Said , social and spiritual events co-ordinator who in fact has recently been co-opted back into the DAM committee to the delight of all.

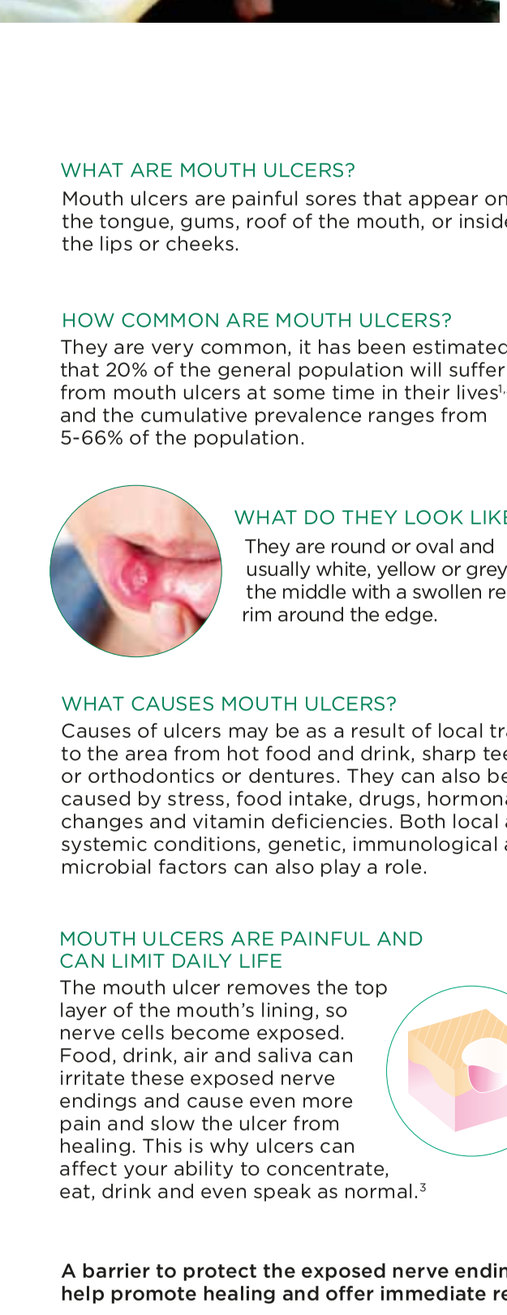
The event was this year held on Sunday 7th February (Carnival Sunday) as the 10th February (St Paul's) was in fact in lent this year. As a matter of fact the real date of St Apollonia is the 9th February but we find it convenient to celebrate the event on the public holiday feast of St Paul's.

This year a mass was held at Santa Skolastika Vittoriosa.

After mass the dentists and guests were shown round the monastery and given coffee by the nuns of the religious order.

The group then descended upon Don Berto to enjoy lunch opposite the marina.

Yet another successful DAM event. Thank you, Lino!



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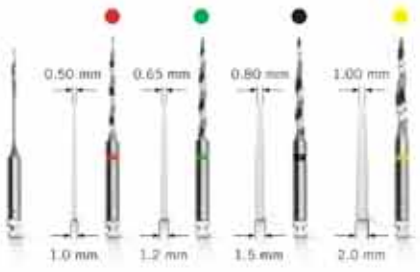

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