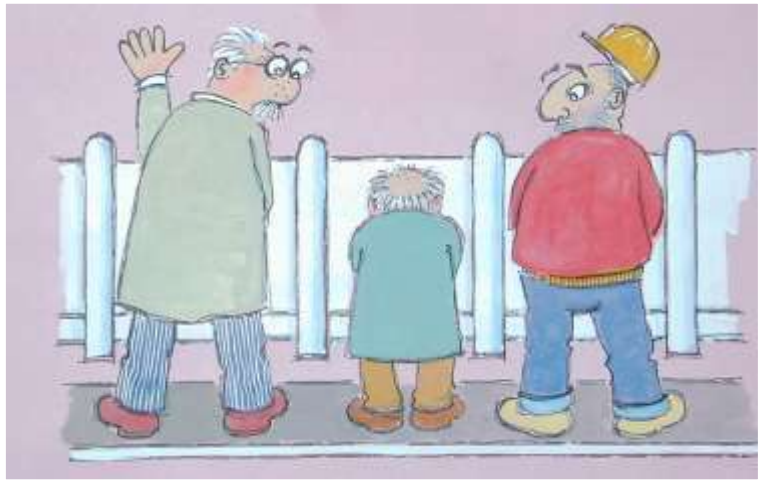
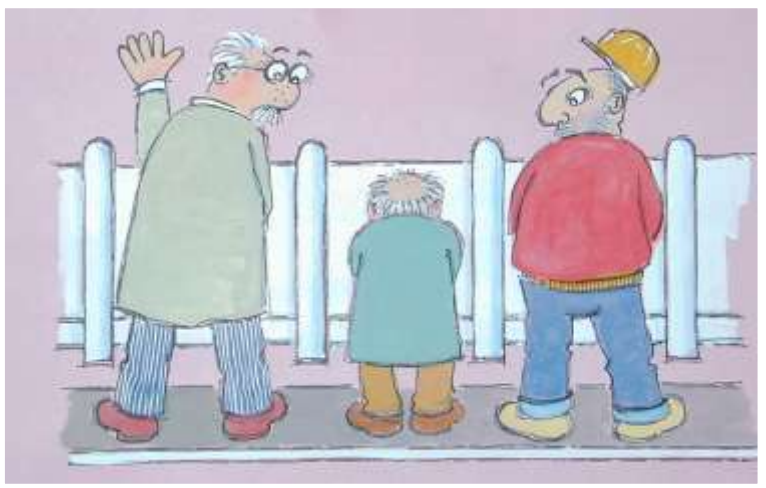
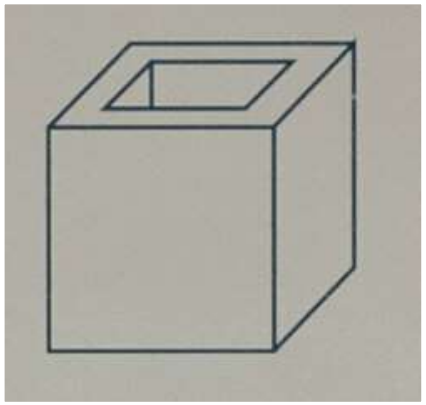
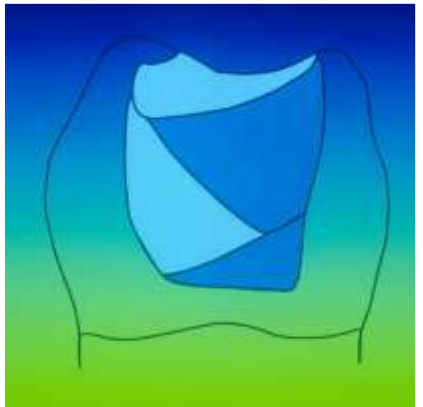
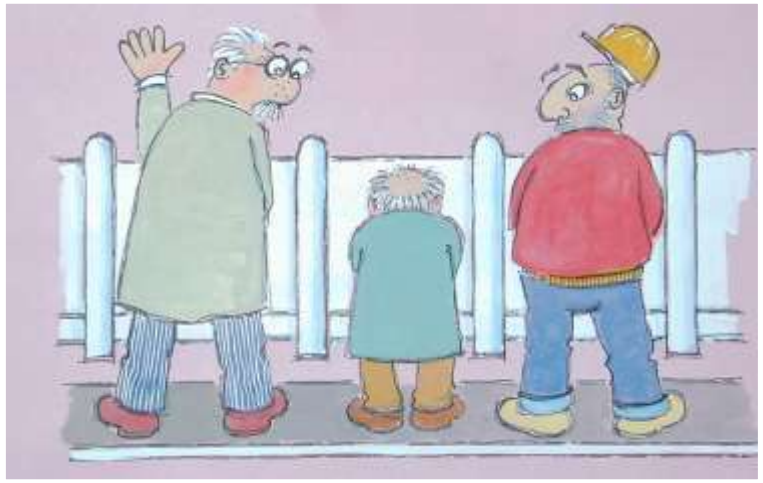


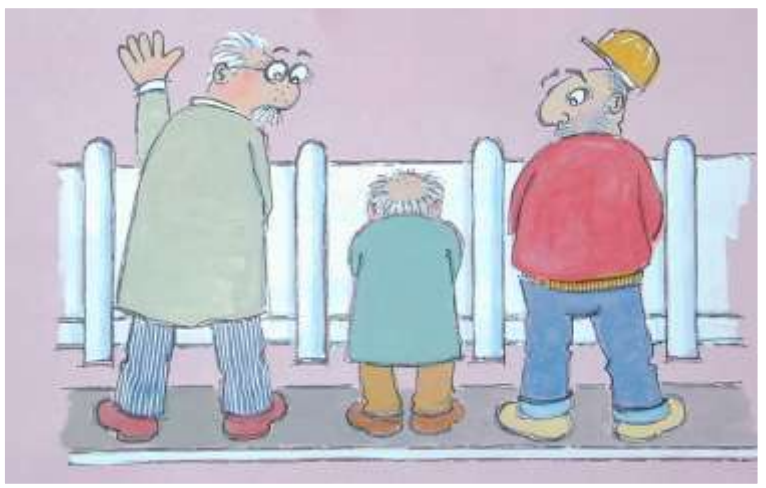


Does size matter?

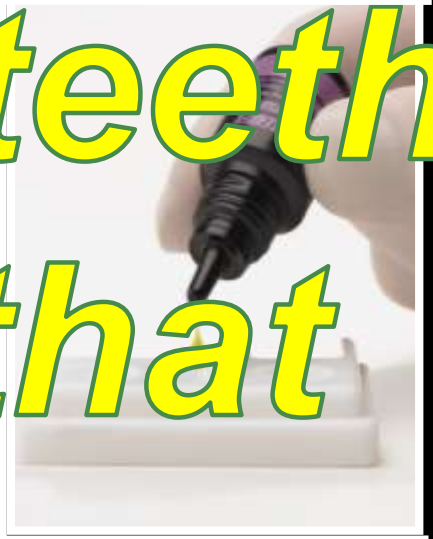


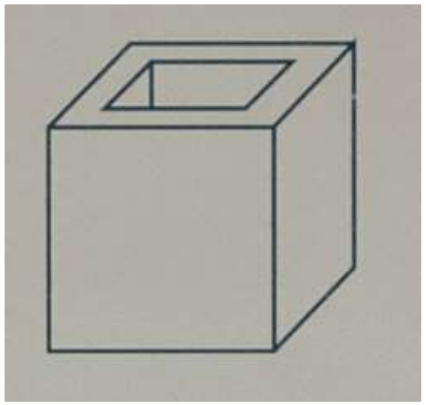


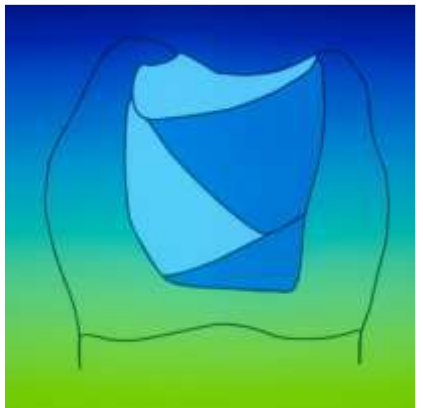




The effect of cutting teeth and alternatives to that







50 years of Dental Update

50 years of evidence-based publishing

Disclosures

"I am not paid by any company to promote their products"

"I will discuss materials, devices and techniques that I have used, but there may be others that are better"

Some manufacturers fund my research"

"I will try to be evidence-based rather than anecdotal"







Learning objectives

On completion of the presentation, listeners should:

- Know the potential damage caused by crown preparation
- Be aware of the latest on dentine adhesives
- Be aware of how to treat tooth wear in a minimally invasive way, and know mini cavity preparations for posterior teeth
- Decide to repair, not replace, defective restorations

my web site

www.fjtburke.com

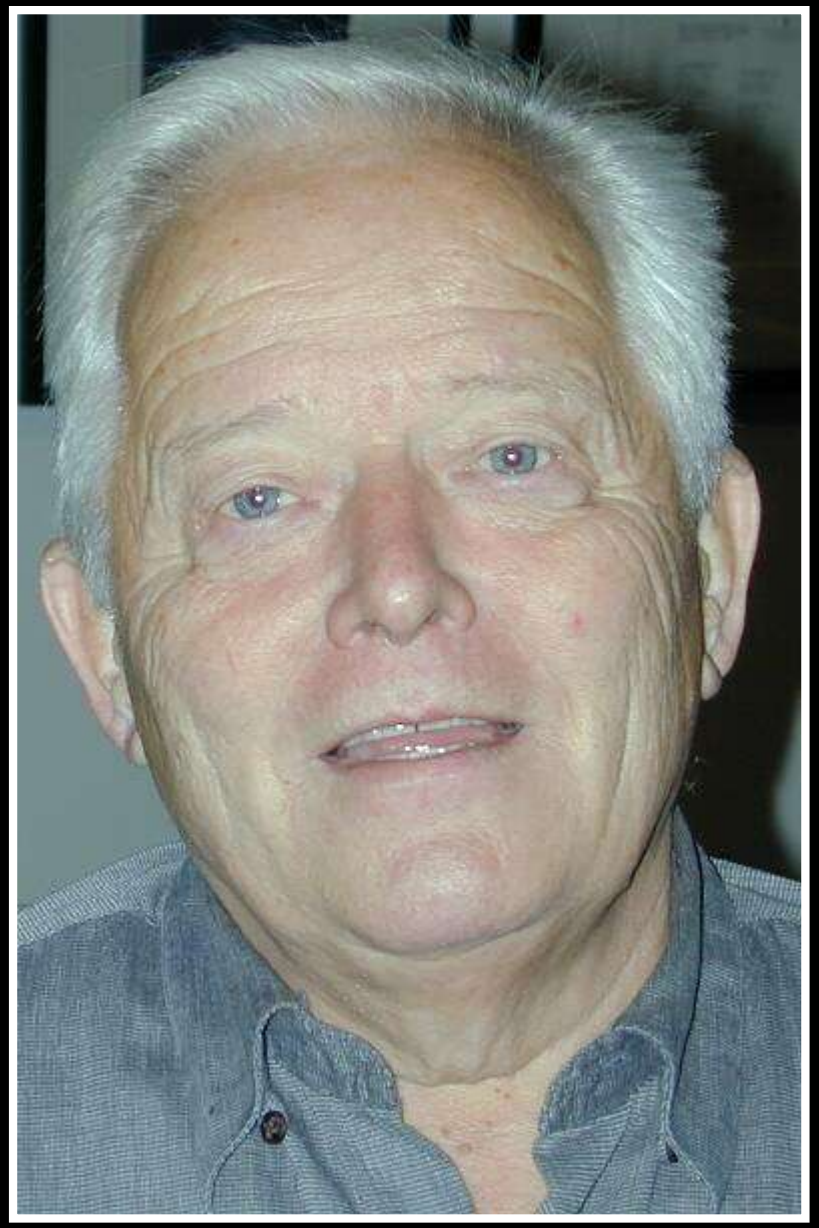
- Contains
- the bullet point
- lists from
- previous lectures

Lecture notes available as:

Does size matter lecture notes

“it is unrealistic to expect controlled longitudinal studies to last more than ten years”

Mjor et al, 1990



The database

- SN7024, available from UKDataService.ac.uk contains anonymized longitudinal data on patients attending the General Dental Services in England and Wales (UK)
- Over three million different patients
- Over 25 million courses of treatment, between 1990 & 2006
- Modified version of Kaplan-Meier methodology used to plot survival curves for different sub-groups

Because of the vast size of the dataset, we can now look at the effect of the restoration on

survival of the tooth

Experts consider Kaplan Meier best for restoration longevity!

JOURNAL OF DENTISTRY 39 (2011) 225–230

available at www.sciencedirect.com

ScienceDirect

journal homepage: www.intl.elsevierhealth.com/journals/jden

Age of failed restorations: A deceptive longevity parameter

Conclusion: In absence of all dates of placement and failure for a series of restorations a reliable measure of restoration longevity is not yet available. Kaplan–Meier statistics remains the preferred method of calculating longevity of a group of dental restorations.

8 December 2010
Accepted 10 December 2010

Keywords:
Longevity
Survival
Median
Dental restoration
Cross-sectional

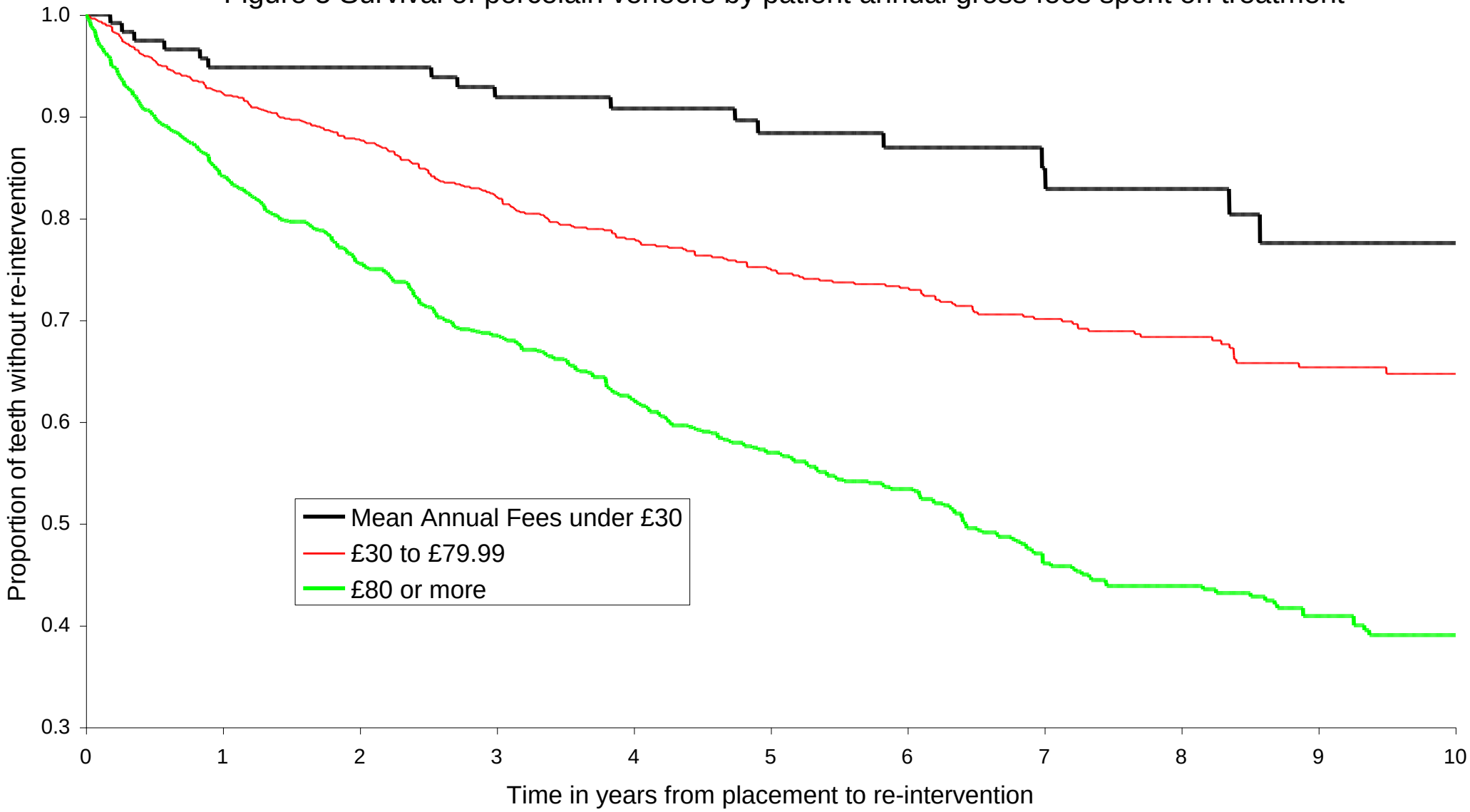
Objectives: This study was undertaken to compare and contrast longevity data for a number of data sets. It investigated if restoration longevity, as calculated by the Kaplan–Meier method, is different from longevity according to the median survival time of failed restorations.

Methods: Existing clinical datasets of dental restorations and an artificial dataset were used to calculate longevity according to Kaplan–Meier statistics and by means of calculation of median age of failed restorations.

Results: The findings indicate that median age of failed restorations may be considered as a deceptive measure of restoration longevity. Specially extending the duration of longitudinal studies of restorations apparently leads to higher values for median age of failed restorations. Restorations of materials that tend to exhibit early failures may have lower values for median age of failed restorations, compared to restorations of different materials which tend to exhibit failures later in clinical service, and thereby not giving a true measure of overall restoration longevity.

Conclusion: In absence of all dates of placement and failure for a series of restorations a reliable measure of restoration longevity is not yet available. Kaplan–Meier statistics remains the preferred method of calculating longevity of a group of dental restorations.

Figure 5 Survival of porcelain veneers by patient annual gross fees spent on treatment



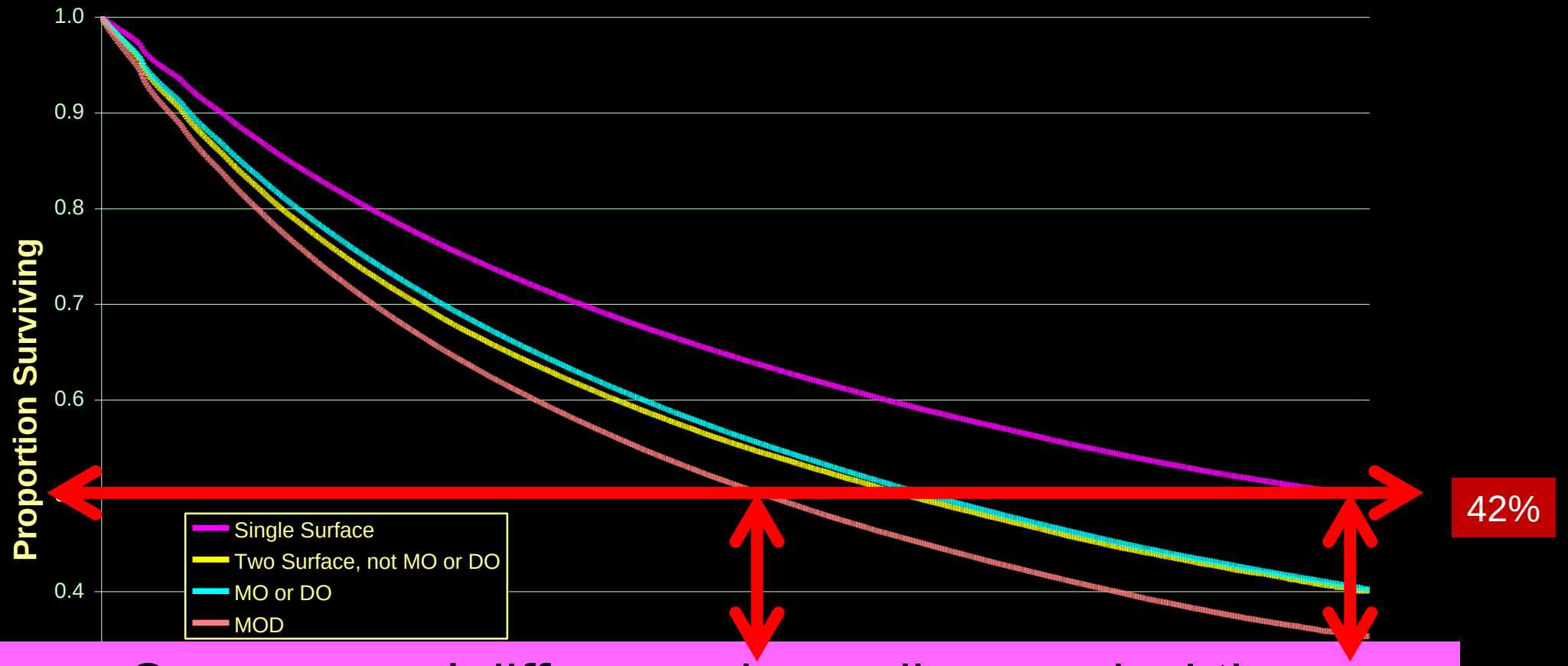
Looking at what has happened will give us a handle on how well restorations (and restored teeth) might survive

This is important when advising patients on how well their treatment might perform, because patients are sueing dentists more each year

Direct placement restorations: amalgam

7,425,049 amalgam cases included, of which 2,537,331, of which had a re-intervention

Amalgam Restoration Survival by Type of Cavity



Seven years' difference in median survival time between MOD restorations and class I restorations

Take home message

Size matters - keeping restorations as small as possible

We can only do this with adhesive dentistry

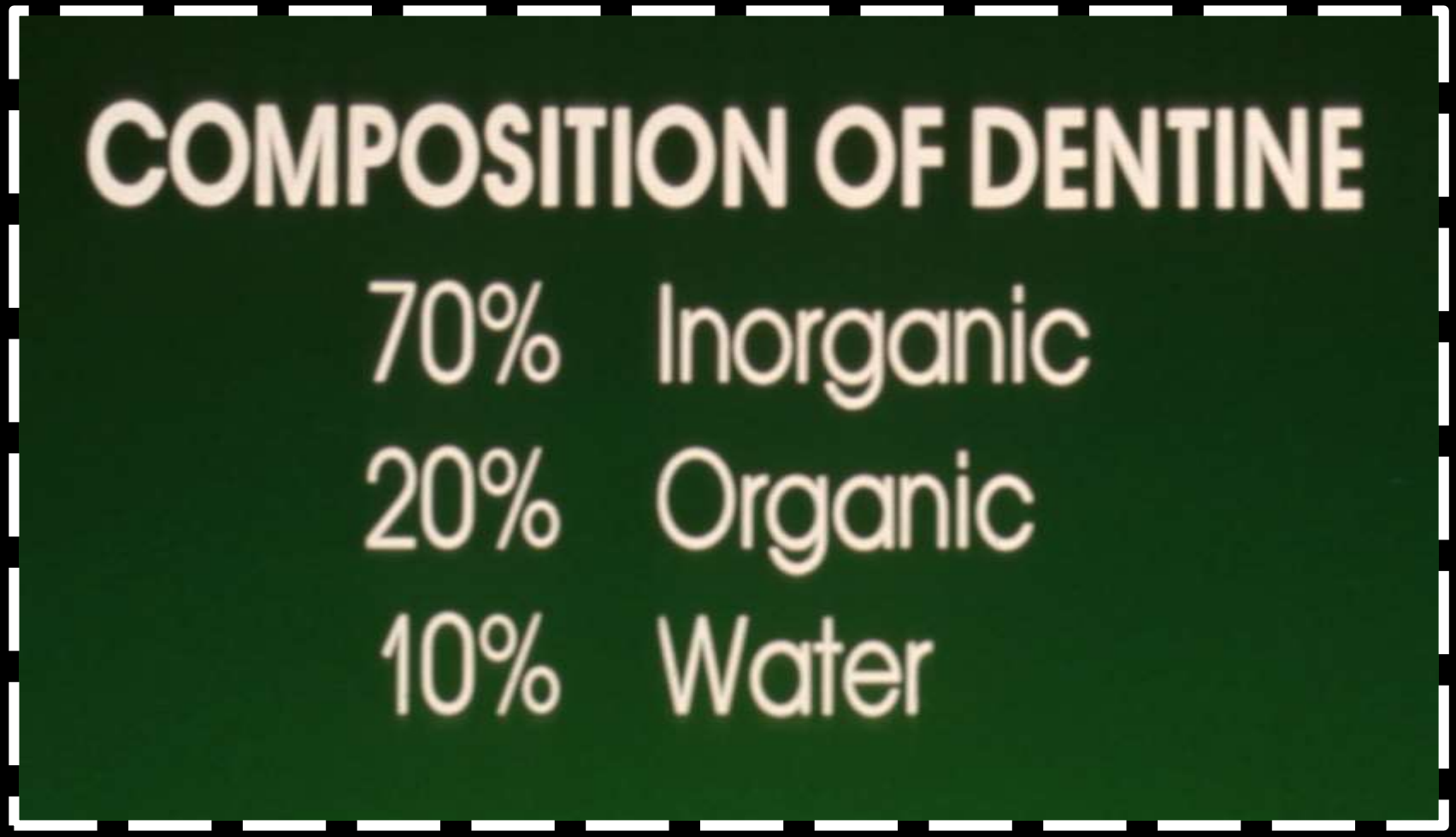
Life expectancy in industrialised countries now 80 years

Therefore mean restoration longevity must be 73 years!

All restorations are temporary, except for the last one!

The current status of dentine adhesives

Problems in bonding to dentine

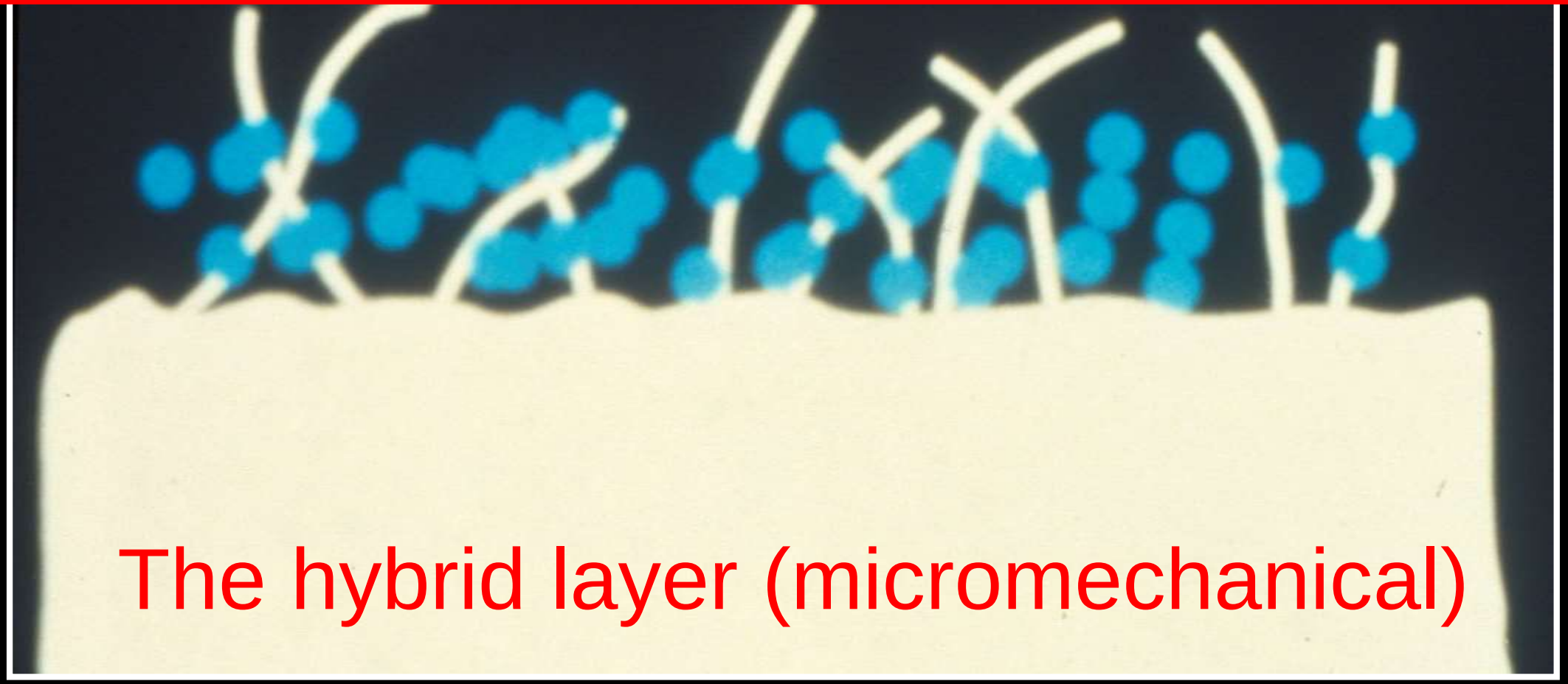


It is a vital substrate

Another problem: The smear Layer

- Thickness:
  0.5 - 5.0 microns
- Will not wash off
- Weak bond to tooth,
  2 – 3 MPa
- Very soluble in
  weak acid

Overdrying causes the collagen to collapse



Nakabayashi N, Kojilma K, Masuhara E. The promotion of adhesion by the infiltration of monomers into tooth substrates. J Biomed Mater Res 1982; 16: 265–273.

….NOW

The Universal Adhesives

Treatment of the smear layer

- REMOVE (Etch & Rinse/Total etch)
- LEAVE/PENETRATE (Self Etch)
- UNIVERSAL MATERIALS (Etch & Rinse, Selective enamel etch, Self etch) (use for direct and indirect)

Etch&Rinse and Self Etch were type specific

Universal bonding agents:

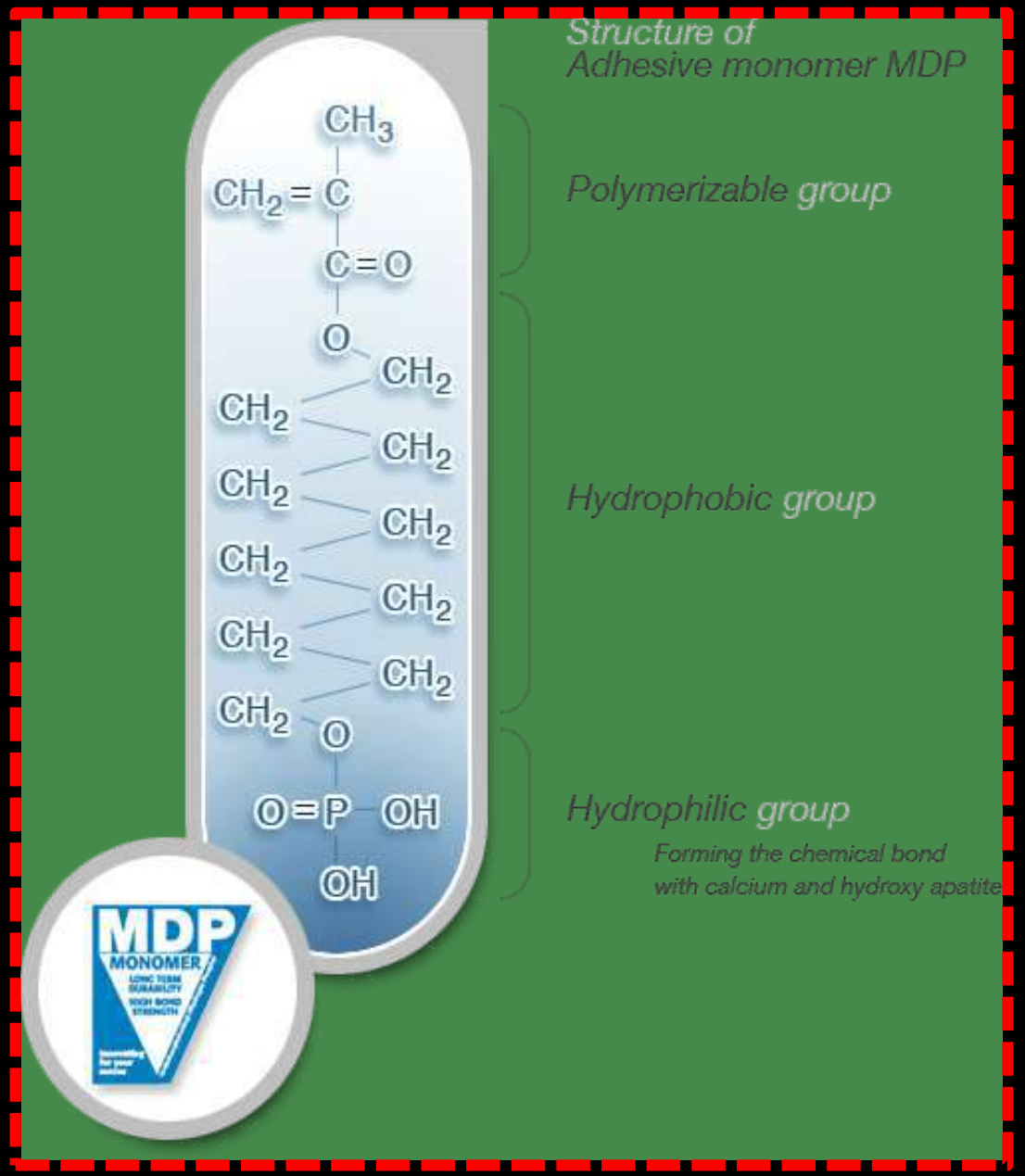
New additions are here!

The first Universal Adhesive: Scotchbond Universal (3M)

Universal bonding agents:

New additions are here!

All contain the resin 10-MDP



Why has 10-MDP become so popular?

10-MDP is important for the bond reaction with HAP

SUMMARY: Universal bonding agents:

Can be used in total etch, self etch, selective enamel etch modes

Are compatible with direct & indirect procedures

Can be used with self & dual cure luting materials (with separate activator)

Are suitable primers for silica & zirconia

Can bond to different substrates (e.g.metal)

Scotchbond Universal Plus: What's different?

It bonds to caries affected dentine

Does everything that SBU did,
but better bond (manufacturer's data)

Improved silane

The gamechanger –
it is radiopaque

Some recent PREP Panel evaluations

The PREP Panel evaluation of G-Premio Bond

2 evaluators, 719 restorations placed

When the evaluators were asked to rate the ease of use of the bonding system which they currently used, the result was as follows:

Difficult to use 1  5 Easy to use

4.6

When the evaluators were asked to rate the ease of use of the G-Premio Bond, the result was as follows:

Difficult to use 1  5 Easy to use

4.9

F J Trevor Burke

Russell J Crisp and Peter Sands

A 'Handling' Evaluation of the Dentsply Sirona Class II Solution System by the PREP Panel

Dent Update 2018; 45: 1032-1040

Practice-based research

The value of practice-based research has been previously discussed,[1] with the arena of general dental practice having been considered the ideal environment in which to carry out evaluations of the handling of dental materials and their clinical effectiveness. In this regard, a wide variety of research projects may be considered to be appropriate to general dental practice, including assessment of materials, devices and techniques, clinical trials of materials, assessment of treatment trends and patient satisfaction with treatment.[1] A UK-based group of practice-based researchers is the PREP (**P**ractitioners **R**esearch and **E**valuation) Panel. This group was established in 1993 with six general dental practitioners (GDPs), and has grown to contain 31 dental practitioners located across the UK, with one in mainland Europe.[2] The group has completed over 70 projects – 'handling' evaluations of materials and techniques, and, more recently, clinical evaluations (n = 8) of restorations placed under general dental practice conditions, with the restorations being followed for up to five years.[3]

FJ Trevor Burke, DDS, MSc, MDS, MGDS, FDS (RCS Edin), FDS RCS(Eng), FFGDP(UK), FADM, Primary Dental Care Research Group, University of Birmingham School of Dentistry, The PREP Panel Ltd, Knutsford, Cheshire, **Russell J Crisp**, BDS, DGDP, The PREP Panel Ltd, Knutsford, Cheshire, **Peter Sands**, MSc, BDS, LDS RCS, MFGDP, General Dental Practitioner, Abingdon, PREP Panel member and part-time

Resin composite systems

As patients increasingly move away from amalgam restorations in their posterior teeth,[3] with the added impetus of the Minamata Agreement by which the use of amalgam has been banned, from 1st July 2018, in children 15 years and younger and in pregnant and nursing women, dental practitioners have had to use an alternative material, the most appropriate of which is resin composite. In this regard, practice-based clinical evaluations of this material have indicated positive results.[4-7] However, in order to obtain such results, along with the resin composite material, a variety of materials and devices must be employed, for example, a dentine-

have been marketed as a single system, the Dentsply Sirona Class II Solution system. It is therefore the aim of this study to evaluate the opinions of a group of practice-based researchers, the PREP Panel, of the components of this system, and the system as a whole.

The Dentsply Sirona products under evaluation therefore are: the dentine bonding system Prime & Bond Active™, the Palodent V3 Sectional Matrix System, SDR® Flow+ composite, Ceram.x Universal composite and the Enhance® Finishing and Polishing System (all manufactured by Dentsply Sirona, Building 3, The Heights, Brooklands, Weybridge, Surrey, KT13 0NY at **www.dentsplysirona.com/en-gb**).

Methods

Selection of participants

All 31 members of the practice-based research group, the PREP Panel, were sent an email communication asking if they would be prepared to be involved in the 'handling' evaluation of a recently-introduced Class II resin composite system. Of those who agreed to participate, 12 were selected at random.

A questionnaire was designed

Figure 1. Prime & Bond Active™

When the evaluators were asked to rate the ease of use of the Prime & Bond Active™, the result was as follows:

Difficult — Easy to use

1 — 5

4.8

The PREP Panel evaluation of Zipbond

A good result!

100% would purchase if available at “average” price

When they were asked if there were any changes the considered essential to the acceptability of the material the following comments were made:

“None”

“Make single dose compule easier to use- may have been just my inexperience using them”

“Packaging of single dose compules a little bulky”

When the evaluators were asked to rate the ease of use of SDI Zipbond, the result was as follows:

Difficult to use 1  5 Easy to use

4.9

593 restorations placed

Trevor's view:

Universal bonding agents generally represent improved ease of use compared with previous bonding agents

…this is good because….

An easy to use material may allow us to produce better results

Special Report

Ease of use versus clinical effectiveness of restorative materials

F. J. T. Burke, DDS, MSc, MDS[1]/ M. Liebler, DDS[2]/ G. Eliades, DDS, Dr Odont[3]/
R. C. Randall, M Phil, BChD[4]

"Ease of use," as applied to dental materials and techiques, means different things to different people. Factors that may contribute to ease of use include a minimum number of application stages, easy application and shaping ability, quickness of use, lack of stick, and moisture sensitivity. Ease of use may also imply that a material or technique does not cause stress for the dentist and patient, is cost effective, is easy to learn, and should provide the operators with a sense of satisfaction with their work. Similarly, "clinical effectiveness" of the treatments prescribed for patients is not always capable of being accurately defined. Suggested factors that may contribute to clinical effectiveness include a lack of patient complaints with respect to longevity and/or cost, no secondary caries, and preservation of the remaining tooth structure during functional loading. Ease of use and clinical effectiveness are not necessarily related, but they must be combined for a technique to be successful. The achievement of this demands a partnership between clinicians, manufacturers, and patients. *(Quintessence Int 2001;32:239–242)*

Recent clinical studies on Universal Adhesives

Anything new since this 2017 publication?

FJ Trevor Burke

Anna Lawson, David JB Green and Louis Mackenzie

What's New in Dentine Bonding?: Universal Adhesives

Abstract: The ability to bond restorations to dentine successfully is central to minimally invasive restorative dentistry. While dentine-bonding agents have gone through a variety of 'generations', it is the purpose of this paper to describe the latest dentine-bonding agents, the Universal Bonding Agents. These materials may be considered 'Universal' insofar as they may be considered to be capable of being used for direct *and* indirect dentistry, as well as being suitable for use in whichever etching modality the clinician considers appropriate, namely self-etch, etch and rinse or selective enamel etch. Laboratory investigations and initial clinical studies hold the promise that Universal Bonding Agents are a forward step in the quest for the ultimate bond to tooth substance.

CPD/Clinical Relevance: New Universal Bonding Agents appear to present a promising advance in bonding to dentine.

Dent Update 2017; 44: ??? ??

Dentine-bonding agents play a strategic role in the sealing and retention (where necessary) of resin composite restorations, which are increasingly placed by dentists worldwide.[1] Bonding to dentine is also central to the practice of minimally invasive dentistry, given that bonded restorations do not require macro-mechanical retentive features such as locks and keys, which are a feature of non-adhesive (amalgam) cavity preparations.[2]

FJ Trevor Burke, DDS, MSc, MDS, MGDS, FDS(RCS Edin), FDS RCS(Eng), FFGDP (UK), FADM, Primary Dental Care Research Group, University of Birmingham School of Dentistry, **Anna Lawson**, BDS, MSc, MPDC(RCS Edin), General Dental Practitioner, Nottingham, **David JB Green**, BDS(Hons), BSc, MFDS RCS(Edin), StR Restorative Dentistry, Birmingham Dental Hospital and **Louis Mackenzie**, BDS, General Dental Practitioner, Birmingham and University of Birmingham School of Dentistry, 5 Mill Pool Way, Pebble Mill, Birmingham B5 7EG, UK.

A dentine-bonding agent should perform the following functions:[3]

- Provide a strong, immediate and permanent bond to dentine;
- Seal the cavity and minimize leakage;
- Resist microbial or enzymatic degradation;
- Provide adhesion *per se* of the restoration in cases where this is necessary;
- Prevent post-operative sensitivity;
- Reduce the risk of recurrent caries;
- Prevent marginal staining;
- Be easy to use.

It is the intention of this paper to update readers on the new group of Universal Dentine Bonding Agents, this being a follow-up to a paper published in 2004 giving details of the last major innovation in bonding to dentine, the introduction of the so-called self-adhesive dentine bonding agents[3] and to other *Dental Update* publications on the subject which readers may wish to read as background or a further update, such as those by Green and Banerjee,[3] Green, Mackenzie and Banerjee[4] and others.[5,6]

A brief history of bonding to dentine

In the past, dentine-bonding agents were classified into generations.[7] However, this means of identifying different groups of bonding agents fell into disarray because of the failure of authorities in the subject to agree on the type of bonding agent which fitted a given 'generation'. Until recently, the classification has therefore been simply, glass ionomer materials, and resin-based dentine-bonding agents, the latter being further classified into *etch and rinse* materials and *self-etch* materials, with some workers classifying the self-etch materials according to their pH.[8]

There are two principal means by which a bond to dentine may be achieved:[9]

- First, glass ionomer materials (GIC – glass-ionomer cements) which were developed in the 1970s, initially being derived from the Fluoro-Alumino-Silicate glass used in the silicate cement materials which were used until the 1960s, but with the phosphoric acid used in silicate cements being substituted by a

Conclusion from this publication:

New Universal bonding agents are an advance in bonding

Dent.Update.2017:44:328-340

FJ Trevor Burke
Louis Mackenzie

Bonding to Dentine: An Update on Universal Adhesives

Abstract: The ability to successfully bond restorations to dentine is central to minimally invasive restorative dentistry. While dentine bonding agents have gone through a variety of 'generations', it is the purpose of this article to describe the latest clinical and laboratory research on universal adhesives. Results from the latest laboratory and clinical research indicates that universal adhesives are a step forward in the quest for the ultimate bond to tooth substance and ease of use of the adhesive. The wide variety of studies that indicates the effectiveness of universal adhesives are discussed, along with research that indicates that selective enamel etching is a beneficial procedure when using these materials.
CPD/Clinical Relevance: Universal adhesives appear to hold promise in the quest for a reliable bond to dentine.
Dent Update 2021; 48: 620–631

Dentine bonding agents play a central role in the sealing and retention (where necessary) of resin composite restorations, which are increasingly placed by dentists worldwide.[1] Bonding to dentine is also central to the practice of minimally invasive dentistry, given that restorations, which may be bonded to tooth substance, do not require the macro-mechanical retentive features such as locks and keys that are a feature of (non-adhesive) dental amalgam or gold cavity preparations.[2]

A dentine adhesive should perform the following functions:[3]

- Provide an immediate, strong and definitive bond to dentine;
- Seal the cavity and minimize leakage;
- Resist microbial or enzymatic degradation;
- Provide adhesion per se of the restoration in cases where this is necessary;
- Prevent post-operative sensitivity;
- Reduce the risk of recurrent caries;
- Prevent marginal staining;
- Be easy to use.

It is the intention of this article to trace the history of dentine adhesives since that is relevant to the performance of the latest group of adhesives, the universal adhesives (UAs), and thereby to update readers on the progress of UAs since a previous *Dental Update* paper in 2017,[4] and to compliment other *Dental Update* publications on the subject, which readers may wish to read as background, such as those by Green and Banerjee,[2] and, Green *et al.*[3]

FJ Trevor Burke, DDS, MSc, MDS, MGDS, FDS (RCS Edin), FDS RCS (Eng), FFGDP (UK), FADM, Emeritus Professor, University of Birmingham School of Dentistry, UK. **Louis Mackenzie**, BDS, FDS RCPS, Head Dental Officer, Denplan UK, Winchester and Clinical Lecturer, University of

A brief history of bonding to dentine

In the past, dentine bonding agents were bonding agents generally fell into disarray because of confusion regarding which 'generation' each type of bonding agent fitted into. Until recently, the classification has therefore been to simply subdivide resin-based dentine bonding agents into etch and rinse materials (also known as total etch materials) and self-etch materials, with some workers classifying these according to the number of steps involved in their placement (one or two), or by their pH.[3,7]

The year 1955 heralded what we now realize to be a game-changing breakthrough in restorative dentistry, namely the genesis of adhesive (and, therefore, more minimally invasive) dentistry by enabling clinicians to bond to enamel, when this was first described by Buonocore.[8] This also has facilitated the development of resin composite materials, with these materials becoming increasingly used worldwide,[1] principally because of patient concerns regarding mercury in dental amalgam, the Minamata Agreement of 2013 that recommended reduction in the use of dental amalgam, and increasing

Dent.Update.2021: 620-631

Hot off the press!

10 laboratory studies included

Finally, recent laboratory studies include the work by Lago and co-workers[39] who compared the shear bond strength of six UAs to dentine, using Clearfil SE Bond (Kuraray) as control. The results indicated highest bond strength values for Scotchbond Universal (3M) (33.9MPa), but this was not significantly different to Clearfil Universal (Kuraray) and Tetric N-Bond (Ivoclar-Vivadent). All six UAs provided superior bond strength values to the Clearfil SE control.

In summary, therefore, laboratory studies appear to confirm that the bond strengths obtained by UAs are generally an improvement over those previously attained, with a selective enamel etch strategy being preferred.

FJ Trevor Burke
Louis Mackenzie

Bonding to Dentine: An Update on Universal Adhesives

Abstract: The ability to successfully bond restorations to dentine is central to minimally invasive restorative dentistry. While dentine bonding agents have gone through a variety of 'generations', it is the purpose of this article to describe the latest clinical and laboratory research on universal adhesives. Results from the latest laboratory and clinical research indicates that universal adhesives are a step forward in the quest for the ultimate bond to tooth substance and ease of use of the adhesive. The wide variety of studies that indicates the effectiveness of universal adhesives are discussed, along with research that indicates that selective enamel etching is a beneficial procedure when using these materials.
CPD/Clinical Relevance: Universal adhesives appear to hold promise in the quest for a reliable bond to dentine.
Dent Update 2021; 48: 620–631

Dentine bonding agents play a central role in the sealing and retention (where necessary) of resin composite restorations, which are increasingly placed by dentists worldwide.[1] Bonding to dentine is also central to the practice of minimally invasive dentistry, given that restorations, which may be bonded to tooth substance, do not require the macro-mechanical retentive features such as locks and keys that are a feature of (non-adhesive) dental amalgam or gold cavity preparations.[2]

A dentine adhesive should perform the following functions:[3]

- Provide an immediate, strong and definitive bond to dentine;
- Seal the cavity and minimize leakage;
- Resist microbial or enzymatic degradation;
- Provide adhesion per se of the restoration in cases where this is necessary;
- Prevent post-operative sensitivity;
- Reduce the risk of recurrent caries;
- Prevent marginal staining;
- Be easy to use.

It is the intention of this article to trace the history of dentine adhesives since that is relevant to the performance of the latest group of adhesives, the universal adhesives (UAs), and thereby to update readers on the progress of UAs since a previous *Dental Update* paper in 2017,[4] and to compliment other *Dental Update* publications on the subject, which readers may wish to read as background, such as those by Green and Banerjee,[2] and, Green *et al.*[3]

FJ Trevor Burke, DDS, MSc, MDS, MGDS, FDS (RCS Edin), FDS RCS (Eng), FFGDP (UK), FADM, Emeritus Professor, University of Birmingham School of Dentistry, UK. **Louis Mackenzie**, BDS, FDS RCPS, Head Dental Officer, Denplan UK, Winchester and Clinical Lecturer, University of

A brief history of bonding to dentine

In the past, dentine bonding agents were bonding agents generally fell into disarray because of confusion regarding which 'generation' each type of bonding agent fitted into. Until recently, the classification has therefore been to simply subdivide resin-based dentine bonding agents into etch and rinse materials (also known as total etch materials) and self-etch materials, with some workers classifying these according to the number of steps involved in their placement (one or two), or by their pH.[5,7]

The year 1955 heralded what we now realize to be a game-changing breakthrough in restorative dentistry, namely the genesis of adhesive (and, therefore, more minimally invasive) dentistry by enabling clinicians to bond to enamel, when this was first described by Buonocore.[8] This also has facilitated the development of resin composite materials, with these materials becoming increasingly used worldwide,[1] principally because of patient concerns regarding mercury in dental amalgam, the Minamata Agreement of 2013 that recommended reduction in the use of dental amalgam, and increasing

Hot off the press!

11 clinical studies included

In summary therefore, there is a strong body of evidence that indicates that recently developed UAs provide clinical effectiveness as good as, or better, than previous 'gold standard' adhesives, and that selective etching of the enamel is desirable, given that the results presented above indicate improved retention rates of class V restorations when the margins are etched, and reduced levels of discolouration around the margins of all restorations. The present authors therefore strongly recommend this procedure. Does that statement apply to all UAs? It is the authors' view that, in view of the similarities between many of the UAs (Table 1[21,22]), and the fact that their pH values tend to lie between 1.5 and 3, it is prudent to suggest that this is carried out if the clinician wishes to limit marginal staining over time.

The current status of resin composite materials for posterior teeth

F J Trevor Burke

Louis Mackenzie and Adrian CC Shorthall

Survival Rates of Resin Composite Restorations in Loadbearing Situations in Posterior Teeth

Abstract: The use of resin composite for routine restoration of cavities in posterior teeth is now commonplace, and will increase further following the Minamata Agreement and patient requests for tooth-coloured restorations in their posterior teeth. It is therefore relevant to evaluate the published survival rates of such restorations. A Medline search identified 144 possible studies, this being reduced to 24 when inclusion criteria were introduced. Of these, ten directly compared amalgam and composite, eight were cohort studies, and six were systematic reviews. was concluded that posterior composites may provide restorations of satisfactory longevity and with survival rates generally similar to published on amalgam restorations. However, the ability of the operator in placing the restoration may have a profound effect.

CPD/Clinical Relevance: With the increasing use of composite for restorations in posterior teeth, it is relevant to note that these provide good rates for survival.

Dent Update 2019; 46: 523–535

144 studies identified, 24 included

Dent.Update.2019:46: 523-535

The conclusion gleaned from the above cohort studies is that resin composite restorations have acceptable survival rates when placed in loadbearing situations in posterior teeth, with AFRs generally within the range 2% to 3%, which the authors consider to

The conclusion gleaned from the above systematic reviews is that resin composite restorations have acceptable survival rates when placed in loadbearing situations in posterior teeth, with AFRs generally within the range 2% to 3%. Risk factors for premature failure include patients at high risk of caries and the presence of a liner or base beneath the resin composite restoration.

CLINICAL REVIEW

N.J.M. Opdam[1]*, F.H. van de Sande[2], E. Bronkhorst[1], M.S. Cenci[2], P. Bottenberg[3], U. Pallesen[4], P. Gaengler[5], A. Lindberg[6], M.C.D.N.J.M. Huysmans[1], and J.W. van Dijken[6]

Longevity of Posterior Composite Restorations: A Systematic Review and Meta-analysis

J Dent Res 93(10):943-949, 2014

[1]Radboud University Nijmegen Medical Centre, College of Dental Sciences, Preventive and Restorative Dentistry, Ph van Leydenlaan 25, PO Box 9101 6500HB Nijmegen, The Netherlands; [2]Federal University of Pelotas, Graduate Program in Dentistry, Gonçalves Chaves, 457, 5th floor, Pelotas, RS, 96015560, Brazil; [3]Vrije Universiteit Brussels, Dept. of Oral Health Sciences, Laarbeeklaan 103, BE 1090 Brussels, Belgium; [4]Faculty of Health and Medical Sciences, University of Copenhagen, Institute of Odontology, Nør DK-2200, Copenhagen, Denmark; [5]Universi Herdecke, Abteilung für Zahnerhaltung und Zahnmedizin, Alfred-Herrhausen-Str. 44, D-58 Germany; and [6]Umeå University, Department of SE-901 85 Umeå, Sweden; *corresponding .opdam@radboudumc.nl

1,551 papers identified
25 met inclusion criteria
12 authors provided raw data
2,816 restorations included,
of which 569 had failed

The conclusion of the present meta-analysis of 12 clinical studies based on raw data is that caries risk and number of restored surfaces play a significant role in restoration survival, and that, on average, posterior resin composite restorations show a good survival, with annual failure rates of 1.8% at 5 years and 2.4% after 10 years of service.

DENTAL MATERIALS 28 (2012) 87–101

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.intl.elsevierhealth.com/journals/dema

Longevity of posterior composite restorations: Not only a matter of materials

Flávio F. Demarco[a,*], *Marcos B. Corrêa*[a], *Maximiliano S. Cenci*[a], *Rafael R. Moraes*[a], *Niek J.M. Opdam*[b]

[a] *Graduate Program in Dentistry, School of Dentistry, Federal University of Pelotas, RS, Brazil*

[b] *Department of Restorative and Preventive Dentistry, Radboud University Nijmegen Medical Centre, Nijmegen, The Netherlands*

34 papers, each with evaluation periods of >5 years.
RESULTS:
Poorer survival rates in molar teeth than in premolars.
Multiple surface fillings more likely to fail than class I
CONCLUSION:“Composite restorations have been found to perform favourably in posterior teeth, with annual failure rates of 1-3%”.

“due to their aesthetic properties and good clinical service, composites have become the preferred standard for direct posterior restorations”.

Bulk fill composites are quicker to place

Title: 1407 - Clinical-time and Postoperative-sensitivity When Using Bulk-Fill Composites With Universal Adhesives

Autho

Chane
Flumi

Elisa A
Sthefane Barbosa, Fluminense Federal University
Leticia Lopes, Fluminense Federal University
Fernanda Calazans, Fluminense Federal University
Stella Marins, Fluminense Federal University
Luiz Augusto Poubel, Fluminense Federal University
Roberta Barcelos, Fluminense Federal University
Marcos Barceleiro, Fluminense Federal University

Abstract:

Objectives: The first objective of this double-blind randomized clinical trial was to compare the different clinical-time using Scotchbond Universal adhesive (3M ESPE), in self-etch or selective enamel-etching strategy, associated with incremental or bulk-fill composite in posterior restorations. The second objective was to compare the postoperative sensitivity, 24h and 48h after the restorations.

Methods: A total of 196 restorations were placed in 43 patients according to the following groups: SETB– Self-etch/bulk fill; SETI– Self-etch/incremental; SEEB- Selective enamel-etching/bulk-fill and; SEEI– Selective enamel-etching/incremental. Filtek Z350XT composite (3M ESPE) was incrementally placed and Filtek Bulk Fill (3M ESPE) was placed using Bulk-fill technique. The adhesive system was used according to manufacturer's instructions. Postoperative-sensitivity was evaluated using two scales (NRS and VAS).

Conclusions: The simultaneous use of the tested Universal adhesive using the self-etching strategy with the tested Bulk-fill composite is less time consuming and does not increase the postoperative risk or intensity when compared with traditional incremental technique.

Filtek Z350 *vs* Filtek Bulk Fill, both placed with SB Universal

"Less time consuming"

Fluminese University, Brazil

Trevor's view:

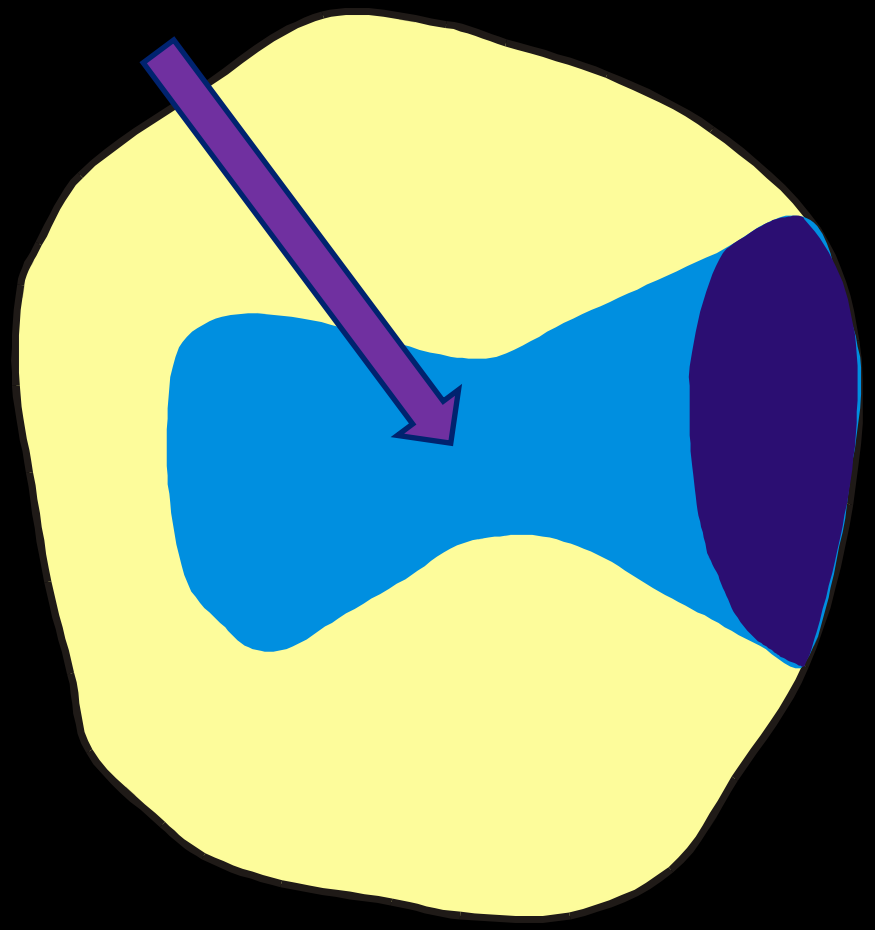
Posterior composites perform as well as amalgams, but cannot be cost effective because they take longer to place *at present*. Perhaps bulk fills are the answer.

Is this non-retentive adhesive cavity design the cavity of choice?

Use a Universal bonding agent

This can be cut without a turbine

Massive tooth substance saved by using adhesive composite restoration



These cavities make sense… but there is a paucity of research into the success of restorations in these cavities

Saucer-shaped cavity preparations for posterior approximal resin composite restorations:Observations up to 10 years.

Nordbo H. et al. Quintessence Int.1998;29;5-11

CONCLUSION: It is concluded that the saucer-shaped resin composite restoration represents a viable treatment modality for small cavities. The time may have come to include it in dental curricula as a routine operative treatment for small class II lesions.

The effect of cavity size on tooth fracture

Brief literature review

A survey of cusp fractures in a population of dental practices: Fennis et al., 2002

- 28 clinicians in Nijmegen
- Recorded information on cusp # for 3 months, including patient age, tooth, size of cavity, restorative material, cause of # etc.

- 238 cases recorded
- Mastication number 1cause
- 77% of # teeth had an MOD restoration, 88% had an amalgam restoration

Root filled teeth significantly more susceptible to subgingival fracture

FRACTURES OF POSTERIOR TEETH: A REVIEW AND ANALYSIS OF ASSOCIATED FACTORS

PURPOS
th
in
POPULA
po
pe
METHOD: *A pro forma was designed to elicit infor*
fracture and the nature and extent of such fractures. Three general dental practitioners were requested to complete a pro forma for each patient presenting with a fractured posterior tooth over a four-month period. Foods and sweets considered to be associated with tooth fracture were identified and their compressive strengths tested.

FINDINGS: *A total of 129 cases of fractured posterior teeth were recorded, of which 48% occurred in the mandibular arch and 52% in the maxillary arch. In the mandible, 75% of tooth fractures occurred in molars while in the maxillary arch 50% occurred in molars. In 57% of cases assessed, no identifiable causative item was noted. Forty-five per cent of fractures were in teeth which had been restored on three or more surfaces. Compressive forces of 0.16KN to 2.2KN were obtained for food items implicated in tooth fractures.*

CONCLUSION: *As mesio-occlusodistal restorations were identified as a major predisposing*

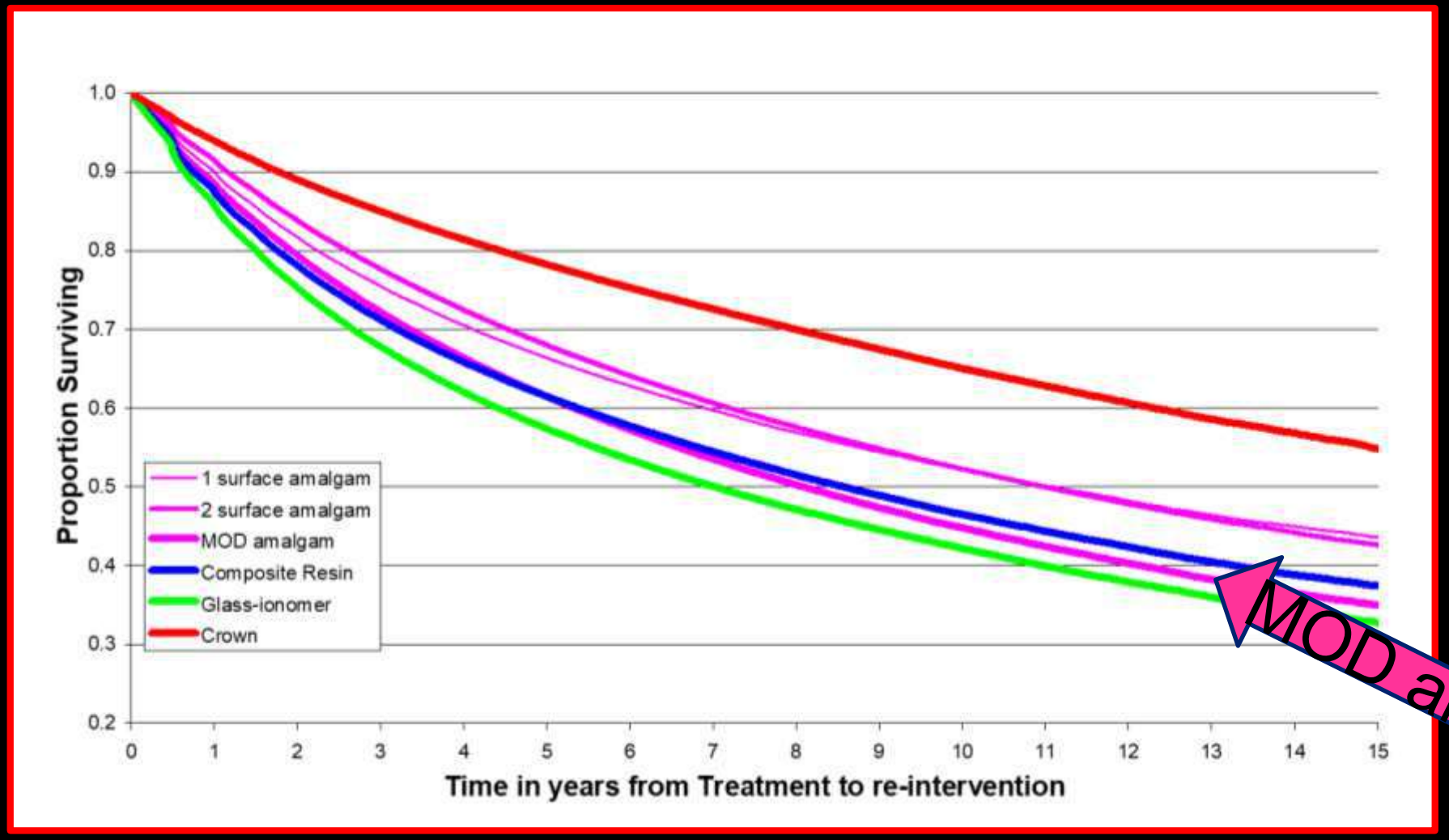
The solution

MOD restorations identified as a major predisposing factor to tooth fracture

Trevor’s view:

Resin composites bonded with Universal adhesives are our current “gold standard” for loadbearing restorations in posterior teeth.

Premolar teeth: the effect of MODs



Time to re-intervention

Premolar teeth: the effect of MODs

MOD restorations in premolars don’t do well, no matter how you look! Therefore..

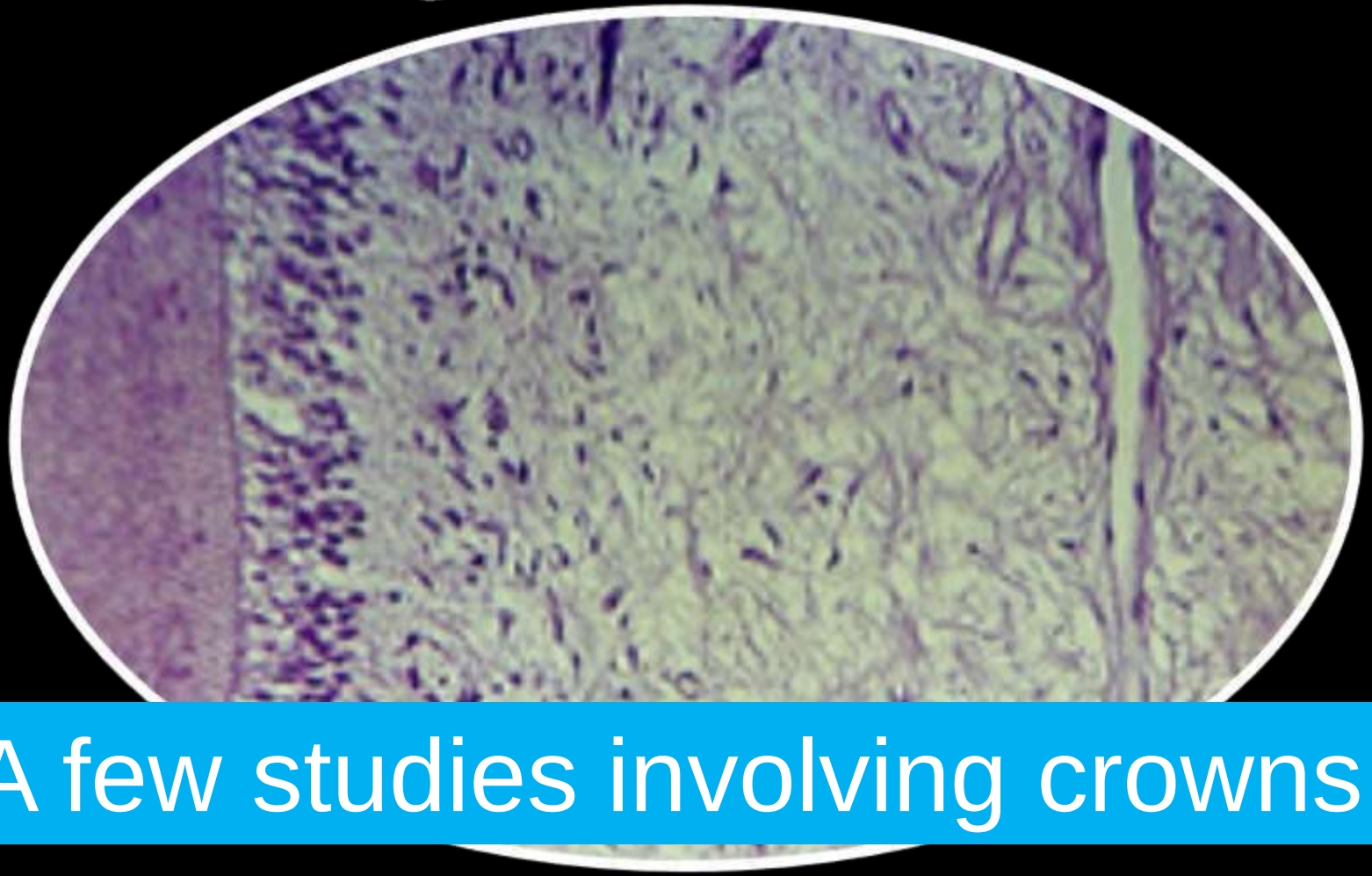
Avoid cusp fracture by…….

Take home message

MOD restorations in premolars don’t do well, no matter how you look! Therefore..

Keep MOD restorations off teeth, especially premolars

Does drilling and filling affect teeth?



A few studies involving crowns

Dentine/pulp reactions to full crown procedures
Dahl BJ, J.Oral Rehabil.1977:4:247-254

Severe acute pulp reactions were observed subjacent to the dentinal tubules cut in full crown preparation

Tooth preparation and pulp degeneration
Christensen GJ. JADA 1997:128:353-354

Factors associated with pulp degeneration include:

- Exothermic chemical reactions of provisional materials
- Inadequately fitting or occluding provisional restorations
- Provisional restorations left on for too long

Tooth preparation and pulp degeneration
Christensen GJ. JADA 1997:128:353-354

Factors associated with pulp degeneration include:

- Use of worn out diamonds and burs
- Improper cutting techniques (heavy cutting loads)
- Excessive preparation depths
- Inadequate water coolant
- Over-drying tooth preparation
- Exothermic chemical reactions of provisional materials

Tooth preparation and pulp degeneration
Christensen GJ. JADA 1997:128:353-354

CONCLUSION

Patients should be warned that pulpal death and endodontic therapy can result from crown placement

Clinical complications in fixed prosthodontics

Goodacre GJ et al.

J.Prosthet.Dent.2003:90:31-41.

Literature review of past 50yrs

Of 823 crowns studied, 27 needed endodontic treatment, mean incidence of 3%, range 0 to 6%

Pulpal evaluation of teeth restored with fixed prostheses

Jackson CR, Skidmore AE, Rice RT

J.Prosthet.Dent.1992:67:323-325

- 130 patients with a crown or bridge fitted 1984-1988
- 603 teeth assessed in 1990
- 166 had already received RCT, leaving 437 crowned while vital
- 5.7% required RCT during the observation period

Prevalence of periradicular periodontitis associated with crowned teeth in an adult Scottish subpopulation

Saunders WP, Saunders EM.
Brit Dent.J.1998:185:137-140

- 802 crowns assessed radiographically after 4 to 7 years
- 458 vital at preparation
- 87 (19%) had radiographic signs of peri-radicular disease
- 344 crowned teeth had previous root filling,
- 51% of these had peri-radicular radiolucency

Prevalence of periradicular periodontitis associated with crowned teeth in an adult Scottish subpopulation

Saunders WP, Saunders EM.
Brit Dent.J.1998:185:137-140.

CONCLUSION:

Pulpal damage may occur during procedures to provide a crown

Updated in 2014 using cone beam

INTERNATIONAL ENDODONTIC JOURNAL

doi:10.1111/iej.12228

Prevalence of periradicular periodontitis in a Scottish subpopulation found on CBCT images

A. Dutta[1], F. Smith-Jack[2] & W. P. Saunders[3]

[1]Department of Restorative Dentistry, Edinburgh Dental Institute, Edinburgh; [2]Department of Oral and Maxillofacial Radiology, University of Bristol Dental Hospital, Bristol; and [3]Department of Restorative Dentistry, University of Dundee School of Dentistry, Dundee, UK

Abstract

Dutta A, Smith-Jack F, Saunders WP. Prevalence of periradicular periodontitis in a Scottish subpopulation found on CBCT images. *International Endodontic Journal*, **47**, 854–863, 2014.

Aim To investigate the prevalence of periradicular periodontitis (PRP) using cone-beam computed tomography (CBCT) scans in a retrospective cross-sectional epidemiological study in a Scottish subpopulation.

Methodology Of the 319 CBCT scans performed at Dundee Dental Hospital between November 2009 and July 2012, 245 dentate scans of patients over 18 years of age were included and 3595 teeth examined. Odds ratios were calculated, and the association between root filling and posts with PRP was determined.

Results Radiological signs of PRP were detected in 209 teeth (5.8%) in 96 patients (male = 55, female = 41) of which 145 (69.4%) were measurable and 64 (30.6%) appeared as periapical widening. Most lesions were seen in the 46–55-year age group and in maxillary anterior teeth (35.4%): 47.4% (*n* = 81) of the total root filled teeth (*n* = 171) had PRP. Of the root filled teeth with lesions, approximately half (50.6%) had an inadequate root filling. Teeth with crowns, but not root filled, accounted for 17.7% of PRP. Periapical changes were detected on a high proportion of teeth with post-retained crowns (70.7%). The presence of a root filling was significantly associated with PRP ($\chi = 17.689$ $P < 0.0001$; odds ratio 16.36 < 23.17 < 32.83, 95% CI) and the presence of a post ($\chi = 10.901$ $P < 0.0001$; odds ratio 21.36 < 43.8021 < 81.78, 95% CI).

Conclusions The prevalence of PRP in a Scottish subpopulation was 5.8%. The presence of a root filling or a post-retained crown was significantly associated with the presence of PRP as determined by CBCT scans. The prevalence of periradicular disease in root filled teeth remains high in the Scottish population.

Keywords: cone-beam computed tomography, cross-sectional study, periradicular periodontitis, prevalence, quality of root filling.

Received 25 June 2013; accepted 4 December 2013

Introduction

Cone-beam computed tomography (CBCT) is a relatively new imaging modality in Endodontology that has been used for a number of diagnostic purposes, including assessment of root canal morphology (Yu et al. 2012), dens invaginatus (Narayana *et al.* 2012, Vier-Pelisser *et al.* 2012), root fractures (Wang *et al.* 2011a) both horizontal and oblique (Wang *et al.* 2011b), root perforations (Shemesh *et al.* 2011) and internal resorption (Patel *et al.* 2010, Bhavsa *et al.* 2011). CBCT has been compared with conventional radiography to assess periapical bone loss in dogs (Ordinola-Zapata *et al.* 2011), ex vivo human mandibles (Patel *et al.* 2009), human cadavers (Tsai *et al.* 2012) and human clinical studies (Estrela *et al.* 2008, Patel *et al.* 2012b). The conclusions of these studies indi-

Correspondence: William P. Saunders, University of Dundee School of Dentistry, Park Place, Dundee, UK (Tel.: +44 1382 381851; e-mail: w.p.saunders@dundee.ac.uk).

All scans taken at Dundee Dental School over 3-year period included

Scans which did not include the apices of teeth excluded

245 patients, 3,595 teeth included

Periapical periodontitis seen in 17.7% of crowned teeth without a root filling,
whereas prevalence overall in sampled teeth was 5.8%

Periapical periodontitis present in 69% of teeth with post crowns

Dutta A, Smith-Jack F, Saunders WP. Int Endo J.2014:47:854-863

Iatrogenic injury to the pulp in dental procedures.
Bergenholtz G. Int.Dent.J.1991:41:99-110.

LITERATURE REVIEW: CONCLUSIONS

Iatrogenic ("dentistogenic") injury to the dental pulp is not an insignificant problem in clinical dentistry

Pulpal necrosis occurs with a frequency of 10-15% over a period of 5-10 years

Trevor’s view:

Drilling isn’t great! ..for teeth

Does cutting Class II cavities cause damage to adjacent teeth?

YES!!!

- Cardwell JE, Roberts BJ. Damage to adjacent teeth during cavity preparation? J.Dent.Res.1972::51:1269-1270
- Long TD. J.Dent.Res.1980:59(Spec.Issue):1799.
- Elderton RJ. Positive dental prevention. London, Heinemann Medical Books, 1987:57-95

Progression of approximal caries in relation to iatrogenic preparation damage

Qvist V, Johannessen L, Bruun M

J.Dent.Res.1992:71:1370-1373

- 77 dentists from Public Dental Health Service in Denmark
- Die-stone models of 187 new Class II cavities
- Examined with stereomicroscope
- Damage found on 66% of adjacent surfaces
- Teeth followed for 7 years

Progression of approximal caries in relation to iatrogenic preparation damage

Qvist V, Johannessen L, Bruun M

J.Dent.Res.1992:71:1370-1373

RESULTS

- Operative treatment needed on 10% of undamaged surfaces
- Operative treatment needed on 35% of damaged surfaces ($p<0.05$)

Progression of approximal caries in relation to iatrogenic preparation damage

Qvist V, Johannessen L, Bruun M

J.Dent.Res.1992:71:1370-1373

CONCLUSION

Iatrogenic preparation damage is a frequent side-effect of operative intervention with approximal caries lesions…the damage increases caries progression and need for restorative treatment of the adjacent teeth

Trevor's view:

Drilling isn't great! ..for teeth

Because of the potential for pulpal damage or damage to adjacent teeth, minimal or non-intervention should always be considered

Tooth structure removal for various preparation designs for anterior teeth

Edelhoff D, Sorensen JA. J.Prosthet.Dent.2002:47:502-509

Tooth structure removal associated with various preparation designs for anterior teeth

Daniel Edelhoff, Dr Med Dent,[a] and John A. Sorensen, DMD, PhD[b]
School of Dentistry, Medical Center, University of Aachen, Germany; and School of Dentistry, Oregon Health Sciences University, Portland, Ore.

Statement of problem. The conservation of sound tooth structure helps preserve tooth vitality and reduce postoperative sensitivity. Innovative preparation designs, like those for porcelain laminate veneers, are much less invasive than conventional complete-coverage crown preparations. However, no study has quantified the amount of tooth structure removed during these preparations.

Purpose. The purpose of this study was to quantify and compare the amount of tooth structure removed when various innovative and conventional tooth preparation designs were completed on different teeth.

Material and methods. A new comprehensive tooth preparation design classification system was introduced. Typodont resin teeth representing the maxillary left central incisor, maxillary left canine, and mandibular left central incisor were prepared with the following designs: partial (V1), traditional (V2), extended (V3), and complete (V4) porcelain laminate veneer preparations; resin-bonded retainer preparation with grooves (A1) and with wing/grooves (A2); all-ceramic crown preparation with 0.8 mm axial reduction and tapering chamfer finish line (F1), all-ceramic crown preparation with 1.0 mm axial reduction and rounded shoulder finish line (F2), and metal-ceramic crown with 1.4 mm axial reduction and facial shoulder finish line (F3). After tooth preparations (10 per group), the crown was separated from the root at the CEJ. The removed coronal tooth structure was measured with gravimetric analysis. Means and standard deviations for tooth structure removal with different preparation designs were calculated and analyzed with analysis of variance at a significance level of $P<.05$.

Results. Significant differences in the amount of tooth structure removal were noted between preparation designs. Ceramic veneers and resin-bonded prosthesis retainers were the least invasive preparation designs, removing approximately 3% to 30% of the coronal tooth structure by weight. Approximately 63% to 72% of the coronal tooth structure was removed when teeth were prepared for all-ceramic and metal-ceramic crowns. For a single crown restoration, the tooth structure removal required for an F3 preparation (metal-ceramic crown) was 4.3 times greater than for a V2 preparation (porcelain laminate veneer, facial surface only) and 2.4 times greater than for a V4 preparation (more extensive porcelain laminate veneer).

Conclusion. Within the limitations of this study, tooth preparations for porcelain laminate veneers and resin-bonded prostheses required approximately one-quarter to one-half the amount of tooth reduction of conventional complete-coverage crowns. (J Prosthet Dent 2002;87:503-9.)

Tooth structure removal for various preparation designs for anterior teeth

Edelhoff D, Sorensen JA. J.Prosthet.Dent.2002:47:502-509

- Typodont teeth
- Prepared for porcelain veneers (4 variations), all-ceramic crowns (2 variations), resin-retainer, metal-ceramic crown
- 10 preparations per group, by one clinician
- Removed tooth structure measured by “gravimetric analysis”

Tooth structure removal for various preparation designs for anterior teeth

Edelhoff D, Sorensen JA. J.Prosthet.Dent.2002:47:502-509

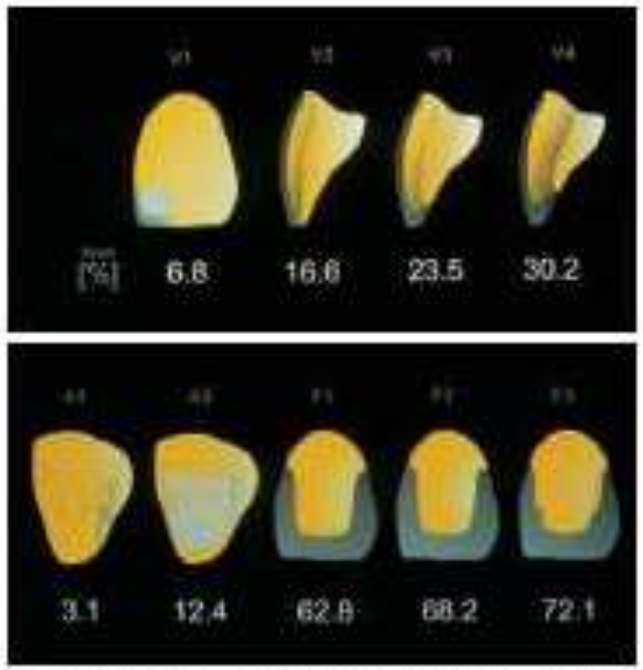


Fig. 9. Comparison of structure removal associated with different preparation designs for maxillary left central incisor. Pink areas represent proximal contact location.

CONCLUSIONS:

☹All-ceramic and metal-ceramic crown preparations required the removal of 63% to 72% of the total crown weight

☹Preparations for veneers and resin-bonded prostheses removed 3% to 30% of crown weight

☹Tooth substance removed for a metal-ceramic crown was 4.3 times greater than for a ceramic veneer

☹Preparation for all-ceramic crowns was 11% less invasive than for metal-ceramic

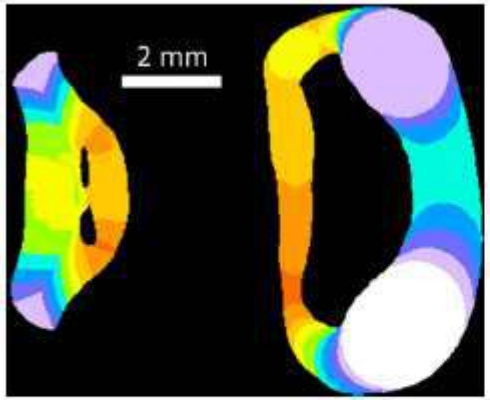


Fig. 3 – Colour-coded residual dentine thickness map and the local thickness map of removed tooth tissue showing the correlation of the extent of over-preparation to areas of thin residual dentine (see Fig. 1 for colour key).

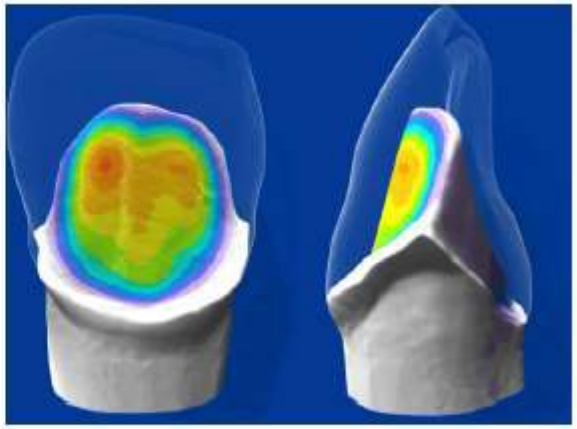
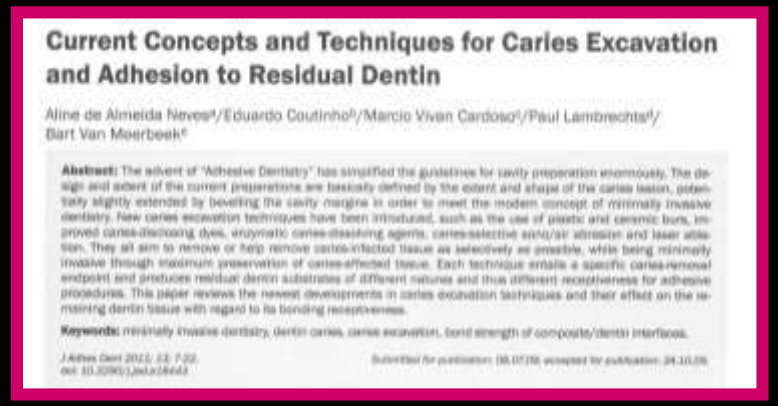


Fig. 4 – Rendered 3D view showing colour coded residual dentine thickness (see Fig. 1 for key) and the outline of the original tooth shape; rendered with Drishti (Australian National University).

The residual dentine thickness following tooth preparation has a critical influence on subsequent pulp degeneration. Murray PE et al. Hierarchy of pulp capping and repair activities. Am.J.Dent.2002:15:236-243.

…with caries (and tooth wear progressing slowly), the pulp has a chance to recover



Current Concepts and Techniques for Caries Excavation and Adhesion to Residual Dentin

Aline de Almeida Neves[a]/Eduardo Coutinho[b]/Marcio Vivan Cardoso[c]/Paul Lambrechts[d]/Bart Van Meerbeek[e]

Abstract: The advent of "Adhesive Dentistry" has simplified the guidelines for cavity preparation enormously. The design and extent of the current preparations are basically defined by the extent and shape of the caries lesion, potentially slightly extended by beveling the cavity margins in order to meet the modern concept of minimally invasive dentistry. New caries excavation techniques have been introduced, such as the use of plastic and ceramic burs, improved caries-disclosing dyes, enzymatic caries-dissolving agents, caries-selective sono/air abrasion and laser ablation. They all aim to remove or help remove caries-infected tissue as selectively as possible, while being minimally invasive through maximum preservation of caries-affected tissue. Each technique entails a specific caries-removal endpoint and produces residual dentin substrates of different natures and thus different receptiveness for adhesive procedures. This paper reviews the newest developments in caries excavation techniques and their effect on the remaining dentin tissue with regard to its bonding receptiveness.

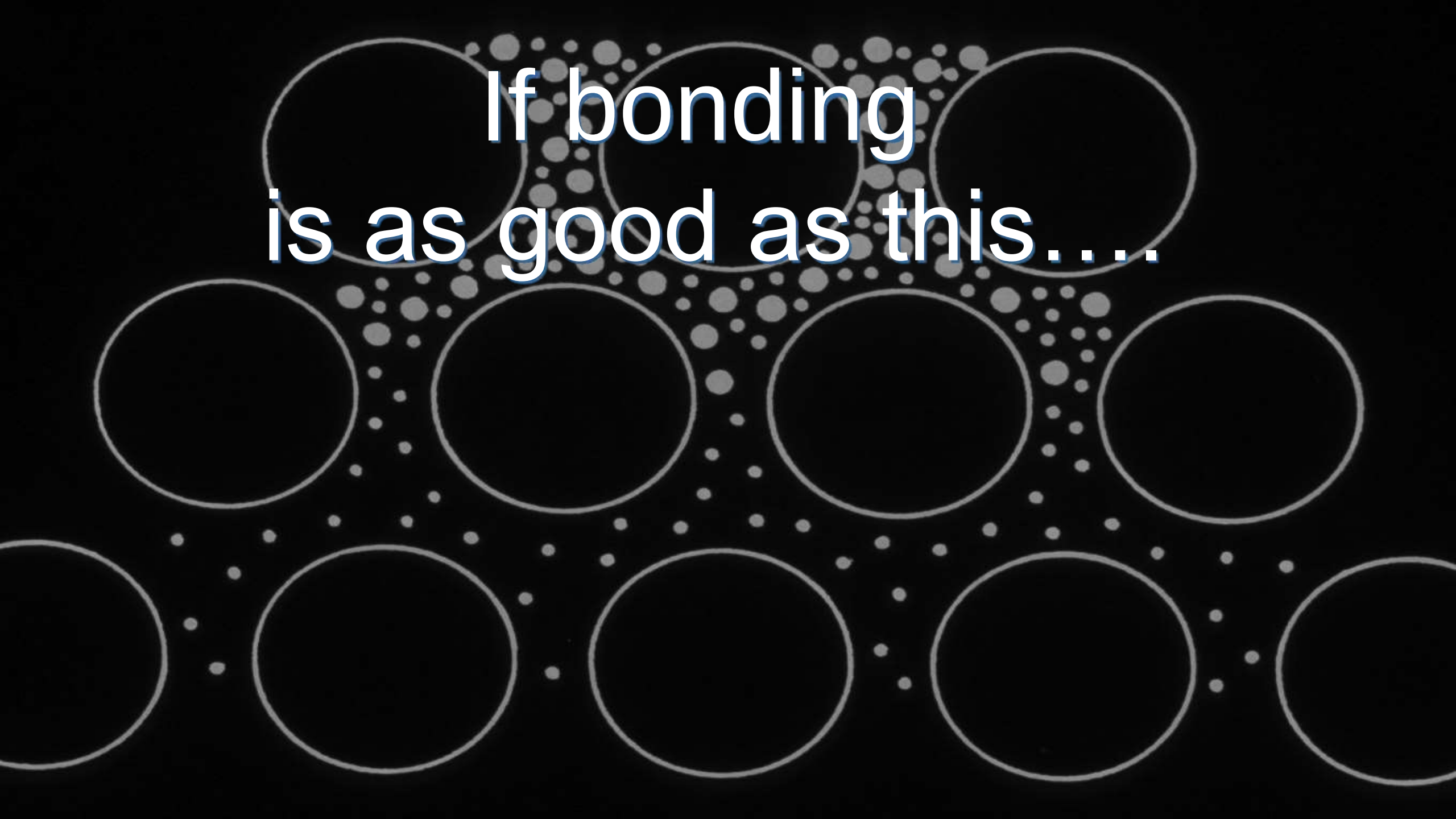
Keywords: minimally invasive dentistry, dentin caries, caries excavation, bond strength of composite/dentin interfaces.

J Adhes Dent 2011; 13: 7-22.
doi: 10.3290/j.jad.a18443

Submitted for publication: 08.07.09; accepted for publication: 24.10.09.

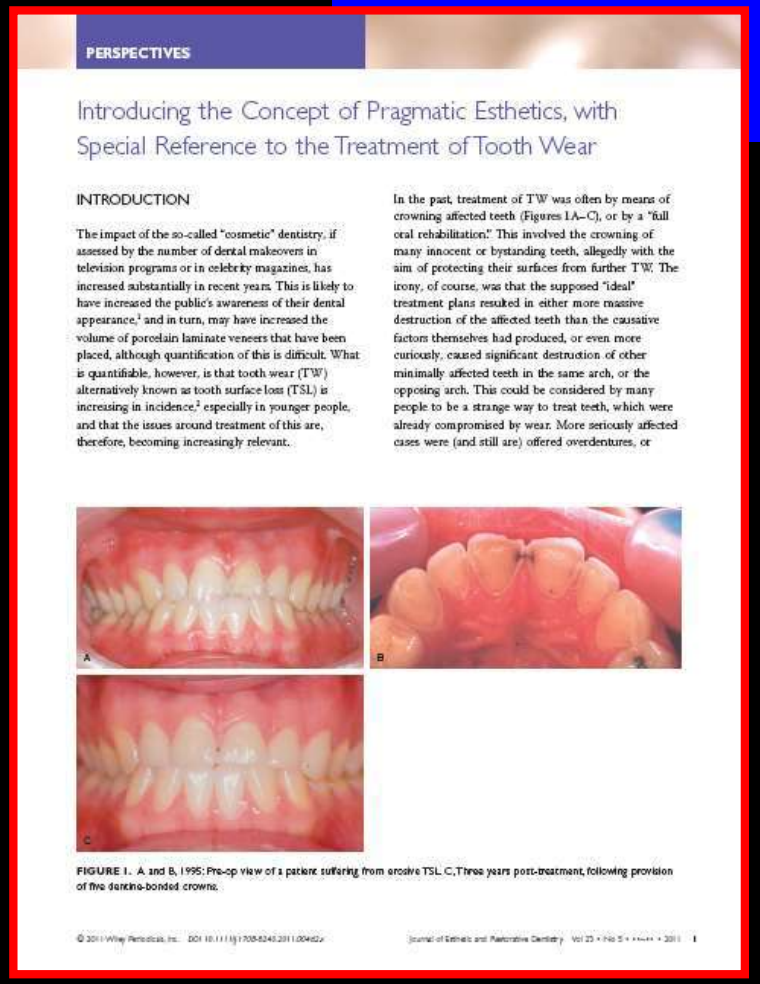
NOT so, with a turbine drill!

Teeth are clever! They can heal!


If bonding
is as good as this….

Bonding composite to worn teeth

The principle of pragmatic aesthetics



PERSPECTIVES

Introducing the Concept of Pragmatic Esthetics, with Special Reference to the Treatment of Tooth Wear

INTRODUCTION

The impact of the so-called "cosmetic" dentistry, if assessed by the number of dental makeovers in television programs or in celebrity magazines, has increased substantially in recent years. This is likely to have increased the public's awareness of their dental appearance,[1] and in turn, may have increased the volume of porcelain laminate veneers that have been placed, although quantification of this is difficult. What is quantifiable, however, is that tooth wear (TW) alternatively known as tooth surface loss (TSL) is increasing in incidence,[2] especially in younger people, and that the issues around treatment of this are, therefore, becoming increasingly relevant.

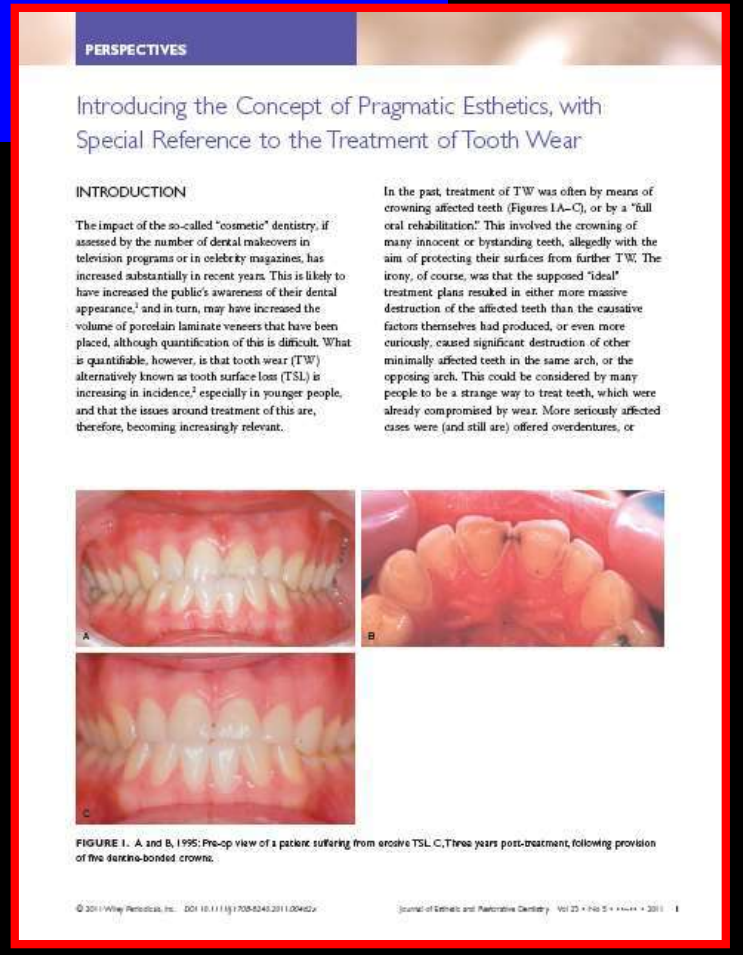
In the past, treatment of TW was often by means of crowning affected teeth (Figures 1A–C), or by a "full oral rehabilitation." This involved the crowning of many innocent or bystanding teeth, allegedly with the aim of protecting their surfaces from further TW. The irony, of course, was that the supposed "ideal" treatment plans resulted in either more massive destruction of the affected teeth than the causative factors themselves had produced, or even more curiously, caused significant destruction of other minimally affected teeth in the same arch, or the opposing arch. This could be considered by many people to be a strange way to treat teeth, which were already compromised by wear. More seriously affected cases were (and still are) offered overdentures, or

FIGURE 1. A and B, 1995: Pre-op view of a patient suffering from erosive TSL. C, Three years post-treatment, following provision of five dentine-bonded crowns.

© 2011 Wiley Periodicals, Inc. DOI 10.1111/j.1708-8240.2011.00402.x Journal of Esthetic and Restorative Dentistry Vol 23 • No 5 • 2011 1

A basic principle: Minimally invasive treatment should be useed where possible

Burke FJT, Kelleher MGD, Wilson N, Bishop K J.Esthet.Restor. Dent.2011:25:1-8.



PERSPECTIVES

Introducing the Concept of Pragmatic Esthetics, with Special Reference to the Treatment of Tooth Wear

INTRODUCTION

The impact of the so-called "cosmetic" dentistry, if assessed by the number of dental makeovers in television programs or in celebrity magazines, has increased substantially in recent years. This is likely to have increased the public's awareness of their dental appearance,[1] and in turn, may have increased the volume of porcelain laminate veneers that have been placed, although quantification of this is difficult. What is quantifiable, however, is that tooth wear (TW) alternatively known as tooth surface loss (TSL) is increasing in incidence,[2] especially in younger people, and that the issues around treatment of this are, therefore, becoming increasingly relevant.

In the past, treatment of TW was often by means of crowning affected teeth (Figures 1A–C), or by a "full oral rehabilitation." This involved the crowning of many innocent or bystanding teeth, allegedly with the aim of protecting their surfaces from further TW. The irony, of course, was that the supposed "ideal" treatment plans resulted in either more massive destruction of the affected teeth than the causative factors themselves had produced, or even more curiously, caused significant destruction of other minimally affected teeth in the same arch, or the opposing arch. This could be considered by many people to be a strange way to treat teeth, which were already compromised by wear. More seriously affected cases were (and still are) offered overdentures, or

FIGURE 1. A and B, 1995: Pre-op view of a patient suffering from erosive TSL. C, Three years post-treatment, following provision of five dentine-bonded crowns.

Oxford English Dictionary Online

pragmatic

Pronunciation: prag’matik

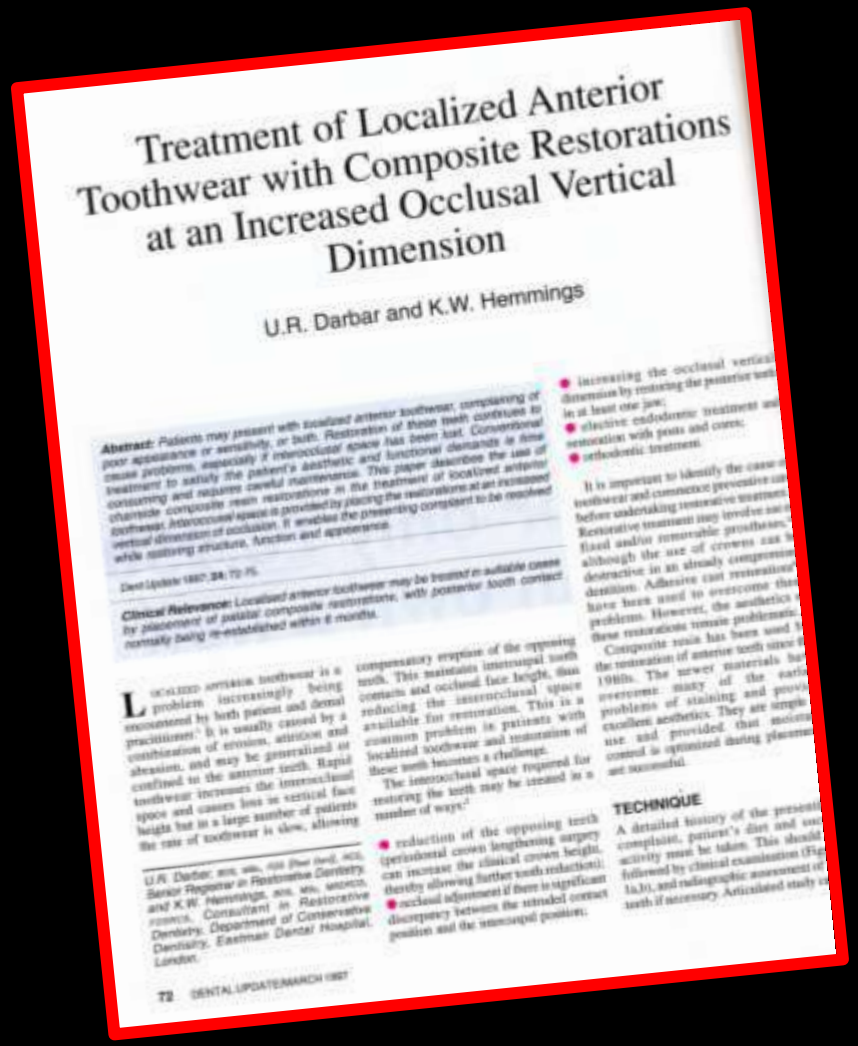
Adjective:

Dealing with things sensibly and realistically in a way that is based on practical rather than theoretical considerations

Origin: via Latin from Greek *pragmatikos* “relating to fact”

A *Dental Update* *UK* first

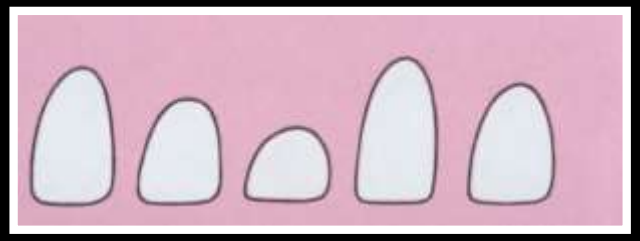
Durbar UR, Hemmings KW. Treatment of localised anterior toothwear with composite restorations at an increased occlusal vertical dimension. Dent.Update.1997:**24**:72-75.

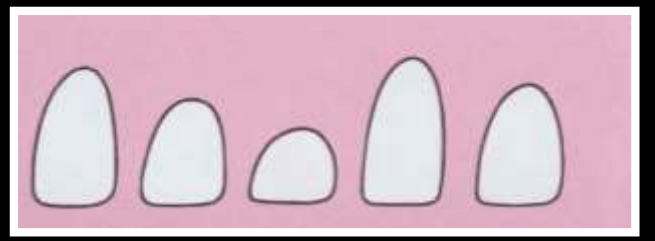


Treatment of Localized Anterior Toothwear with Composite Restorations at an Increased Occlusal Vertical Dimension

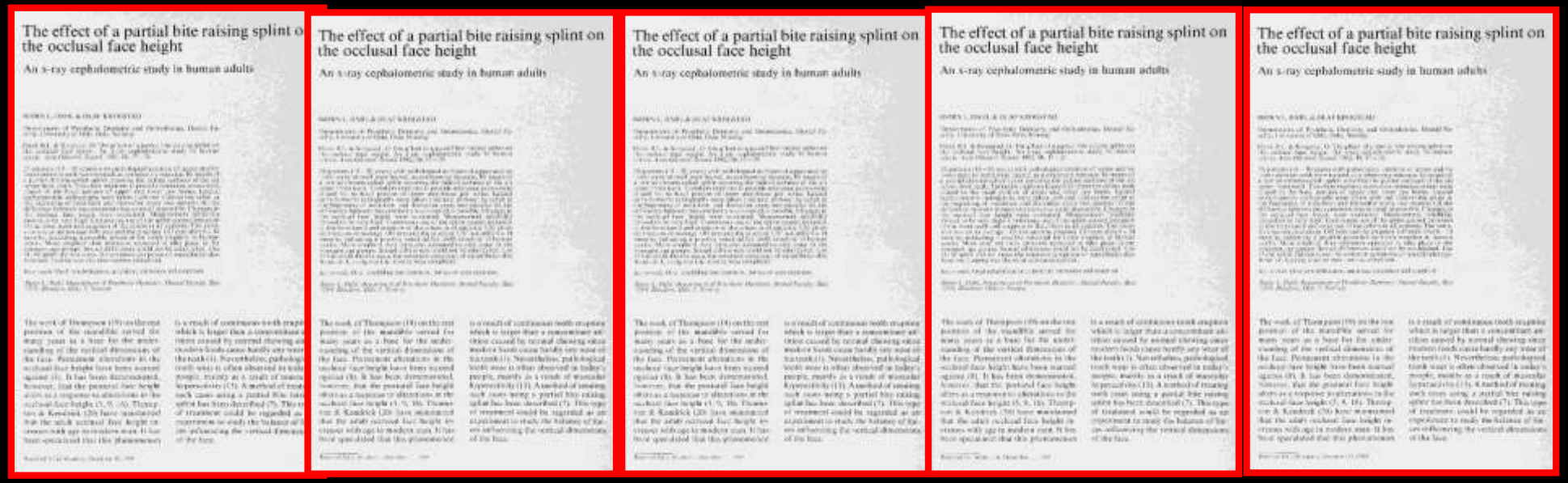
U.R. Darbar and K.W. Hemmings

RESTORATIVE DENTISTRY





The “Dahl” approach



First, Patient consent: they must read a Patient Information Leaflet

Information sheet for patients receiving resin composite restorations for treatment of tooth wear

Your anterior teeth will receive adhesive resin composite restorations to cover the exposed dentine and prevent it from wearing further: this is the principal reason for treatment

An improvement in appearance of your teeth will be effected if possible

You will not be able to chew on your back teeth for a period of 3 to 6 months, and you

cut your food into small pieces to avoid intestinal

Your back teeth will

The

Your

Your

you will be unsure exactly where to place your jaw to get tooth to tooth contact: however, you should become accustomed to your new “bite” after a few days

The procedure will normally be carried out without the need for local anaesthesia as there will be no, or minimal, need for tooth reduction.

If you have crowns, bridges or a denture in the posterior part of your mouth, it is likely that these will require replacement.

Regarding the longevity of the restorations:

The reliability of the restorations should be good, but that there was a small potential for restorations to de-bond, since bonding, albeit better than 15 years ago, was still not as good as dentists might wish.

The margins of the restorat

Occasionally, chipping of th

Burke FJT. Information for Patients Undergoing with Resin Composite Restorations Placed at an Increased Occlusal Vertical Dimension. Dent. Update 2014:41:28-38.

Available as a Word document on my web site

A small % of restorations debond

Using the restoration as the appliance

But…. patients must be advised that treatment is to protect their worn and wearing dentition, not necessarily to improve the appearance of their teeth

Using the restoration as the appliance

Cases where aesthetics is not a problem

My first “Dahl” case in 1998

24 year male
Coca Cola/Irn Bru +++
c/o Sensitivity
No aesthetic concerns

Diagnosis Erosive TW: Treatment?

Counselling re diet

Crown all anterior teeth

Composite additions to worn palatal surfaces at increased OVD

Patient advised of options and given PIL

Composite applied to palatal surfaces: occlusal adjustment are often difficult on placement visit

Occlusal adjustments after one week

Back teeth dyscluded (not much!)

Patient advised that back teeth will be “biting together” after 2 to 3 months

Sure enough, after 4 weeks

Would I do anything different today?

Using the restoration as the appliance

A case where aesthetics may be improved as part of the composite bonding

Roughen the shiny surfaces prior to bonding

…one side at a time, metal strips interproximally

A week later: occlusal adjustment in ICP, lateral & protrusive excursions

A good philosophy!

A guide to managing tooth wear: the Radboud philosophy

B. Loomans*[1] and N. Opdam[1]

Key points

Provides an overview of the philosophy and the management of the Radboud Tooth Wear Project from monitoring and counselling to a full rehabilitation.	Emphasises the need of counselling and monitoring to objectively evaluate the progression of tooth wear over time and determine the patients' commitment for a possible restorative rehabilitation.	Illustrates several minimally invasive and adhesive restorative strategies for the treatment of severe tooth wear patients.

A must read paper for dentists who treat TW or who plan to start

are preferred when severe tooth wear patients are to be treated in increased vertical dimension, especially when young

Published 2 March 2018, Br Dent.J

Fig. 8 This series of slides shows a 22-year follow-up of a male patient (22 years old) with severe tooth wear. In 1995 (intake) a rehabilitation in increased VDO was performed with direct composite restorations (Clearfil AP-X), without involving lower anterior teeth. In 2011 the patient complained of multiple fractures and wear of the lower anterior teeth, and it was decided to do a second rehabilitation with direct composite in increased VDO (Clearfil AP-X) also including lower anterior teeth. In 2017, the result was still satisfying although progressive wear, especially in lower anterior teeth is observed. The patient has no protective night guard. Remarkable observations in this 22-year follow up case are the satisfying performance of direct composite for more than a decade where a second minimally invasive rehabilitation could be done


16–year recall (2011)

A guide to managing tooth wear: the Radboud philosophy

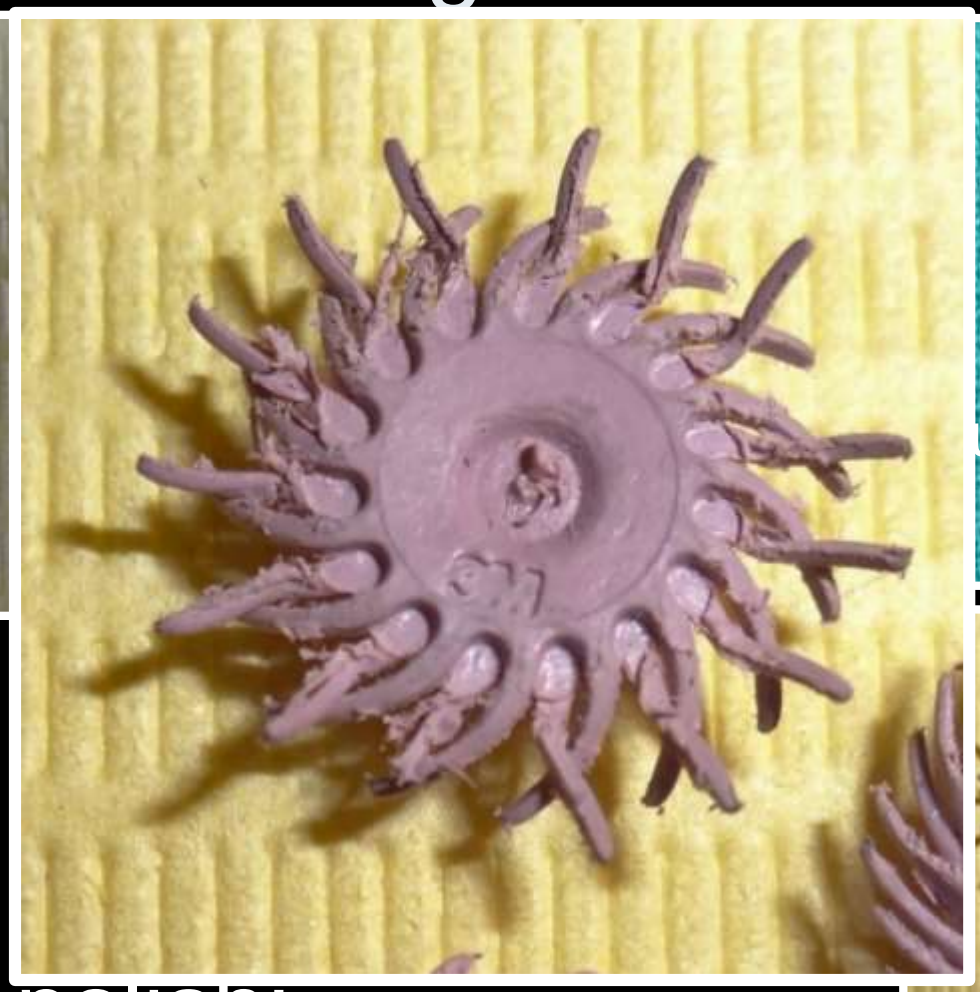
B. Loomans*[1] and N. Opdam[1]

WOW! WOW!

I think that the Soflex Diamond Spiral is terrific!

Soflex Spirals:Use with gentle flowing motion:

Spiral before use

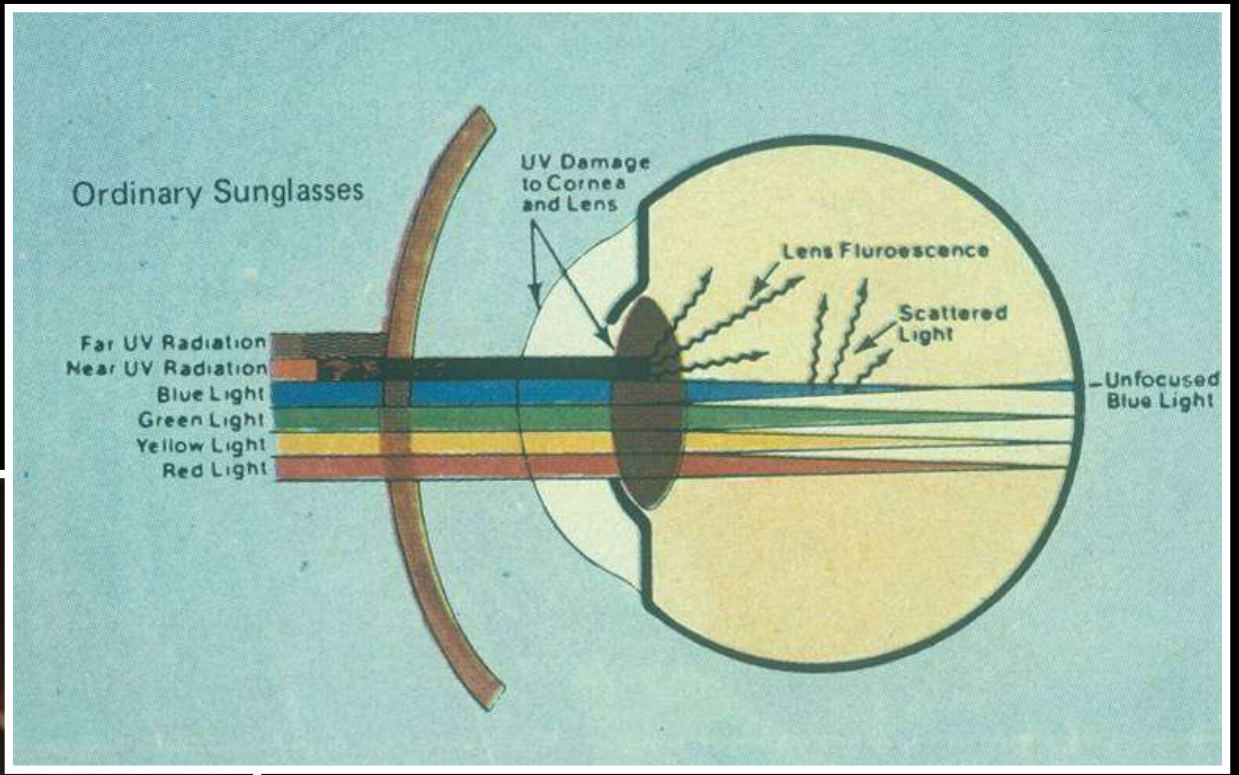


under
ure!!

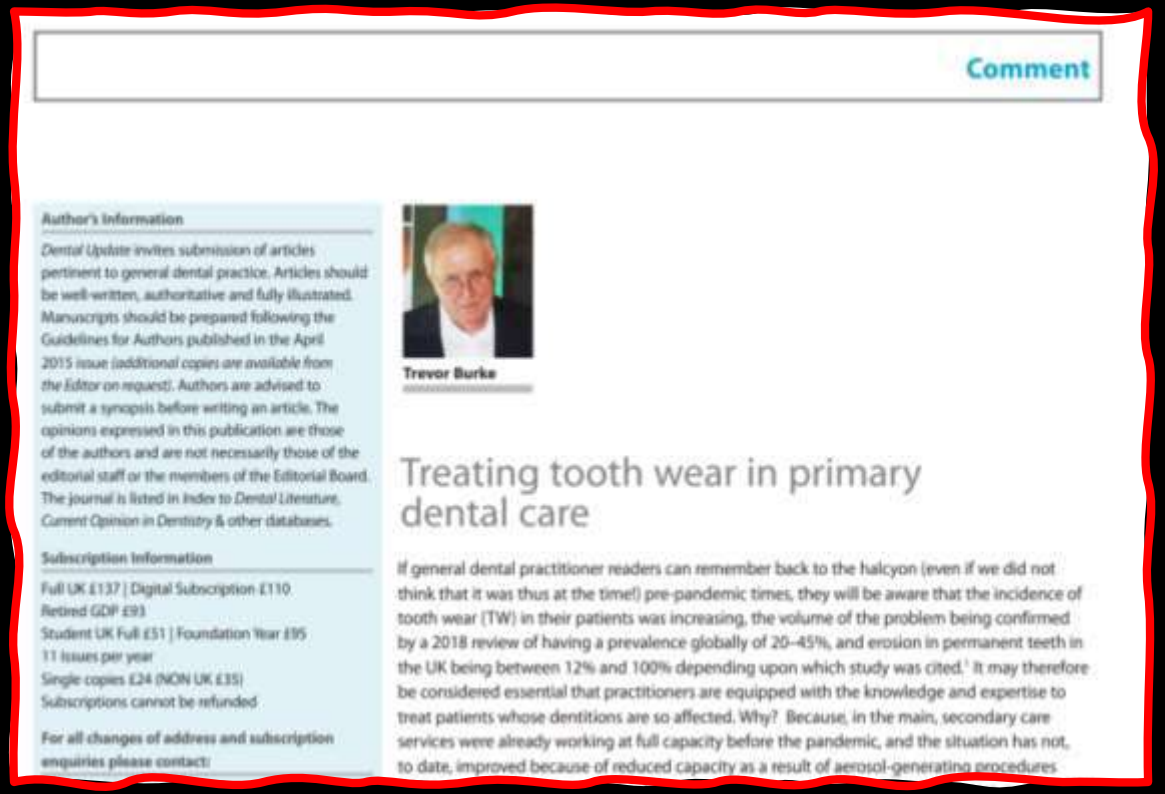
These polish:
they do not cut!

Optragate
(Ivoclar-Vivadent)

DANGER!



Avoid retina burns



Comment

Author's Information

Dental Update invites submission of articles pertinent to general dental practice. Articles should be well-written, authoritative and fully illustrated. Manuscripts should be prepared following the Guidelines for Authors published in the April 2015 issue (additional copies are available from the Editor on request). Authors are advised to submit a synopsis before writing an article. The opinions expressed in this publication are those of the authors and are not necessarily those of the editorial staff or the members of the Editorial Board. The journal is listed in *Index to Dental Literature*, *Current Opinion in Dentistry* & other databases.

Subscription Information

Full UK £137 | Digital Subscription £110
Retired GDP £93
Student UK Full £51 | Foundation Year £95
11 issues per year
Single copies £24 (NON UK £35)
Subscriptions cannot be refunded

For all changes of address and subscription enquiries please contact:

Trevor Burke

Treating tooth wear in primary dental care

If general dental practitioner readers can remember back to the halcyon (even if we did not think that it was thus at the time!) pre-pandemic times, they will be aware that the incidence of tooth wear (TW) in their patients was increasing, the volume of the problem being confirmed by a 2018 review of having a prevalence globally of 20–45%, and erosion in permanent teeth in the UK being between 12% and 100% depending upon which study was cited.[1] It may therefore be considered essential that practitioners are equipped with the knowledge and expertise to treat patients whose dentitions are so affected. Why? Because, in the main, secondary care services were already working at full capacity before the pandemic, and the situation has not, to date, improved because of reduced capacity as a result of aerosol-generating procedures

….hopefully, the debate will start soon, before too much more enamel & dentine is lost

. . . . how to make treatment of TW financially viable in England and Wales under the UDA system. There needs to be a debate with the funders of treatment on how to encourage NHS practitioners to undertake resin composite bonding additive techniques in their practices, because it may be considered certain that treating patients in primary dental care practices will be more cost effective than referral and treatment in secondary care.

The literature on “Dahl” treatment of tooth wear is now extensive

Some examples…..

Summary of results from early published research…

"Direct composite restorations have distinct biological advantages compared with crowns, and for the majority of patients they perform well, offer a **high degree of patient satisfaction** & require an **acceptable level of maintenance.** Patient accomodation to the technique was good. **No detrimental effect on TMJ, periodontal or pulpal health. Bulk fracture and failure were uncommon."**

Clinical Performance of Direct Composite Restorations for Treatment of Severe Tooth Wear

Jorien T. Hamburger[a]/Niek J.M. Opdam[b]/Ewald M. Bronkhorst[c]/Cees M. Kreulen[d]/
Joost J.M. Roeters[e]/Marie-Charlotte D.N.J.M. Huysmans[f]

- 332 restored teeth, 23 showed failures (6.9%). Eight had major failures (2.4%), 11 (3.3%) had minor failures.
- Four restorations (1.2%) [illegible] to secondary cari[illegible]
- Pati[illegible] no canine guidance had [illegible] rates of failure.
- High patient satisfaction(on VAS).

Mean annual failure rate of 1.9%

Treatment of TW in Liverpool

Journal of Dentistry 44 (2016) 13–19

Contents lists available at ScienceDirect

Journal of Dentistry

journal homepage: www.intl.elsevierhealth.com/journals/jden

The survival of direct composite restorations in the management of severe tooth wear including attrition and erosion: A prospective 8-year study

A. Milosevic[a,*], G. Burnside[b]

[a] Department of Restorative Dentistry, Liverpool University Dental Hospital, Pembroke Place, Liverpool, Merseyside L3 5PS, UK
[b] The University of Liverpool, Dental Research Wing, Daulby Street, Liverpool, L69 3GN, UK

ARTICLE INFO

Article history:
Received 8 April 2015
Received in revised form 22 September 2015
Accepted 21 October 2015

Keywords:
Composite survival
Tooth wear
Attrition

ABSTRACT

Objectives: Survival of directly placed composite to restore worn teeth has been reported in studies with small sample sizes, short observation periods and different materials. This study aimed to estimate survival for a hybrid composite placed by one clinician up to 8-years follow-up.
Methods: All patients were referred and recruited for a prospective observational cohort study. One composite was used; Spectrum® (DentsplyDeTrey). Most restorations were placed on the maxillary anterior teeth using a Dahl approach.
Results: A total of 1010 direct composites were placed in 164 patients. Mean follow-up time was 33.8 months (s.d. 27.7). 71 of 1010 restorations failed during follow-up. The estimated failure rate in the

Journal of Dentistry 44 (2016) 15–25

Contents lists available at ScienceDirect

Journal of Dentistry

journal homepage: www.intl.elsevierhealth.com/journals/jden

Composites placed in maxillary anterior teeth
using the “Dahl approach”
1010 restorations, 164 patients
Follow up time was 34 months

ARTICLE INFO

Article history:
Received 8 April 2015
Received in revised form 25 September 2015
Accepted 24 November 2015

Keywords:
Composite restoration
Tooth wear
Attrition

ABSTRACT

Objectives. Survival of directly placed composite in anterior permanent teeth has been reported in studies with small sample sizes, short observation periods and different materials. This study aimed to evaluate survival for a hybrid composite placed by one clinician up to 8 years follow up.

Methods. All patients were referred and recruited for a prospective observational cohort study. One composite was used: Spectrum® (Dentsply/DeTrey). Most restorations were placed on the maxillary anterior teeth using a Dahl approach.

Results. A total of 1010 direct composites were placed in 164 patients. Mean follow up time was 33.8 months (std. 27.7). 71 of 1010 restorations failed during follow up. The estimated failure rate in the

CONCLUSIONS

"On an average follow up time of 33 months, only 71 of 1010 restorations failed.
Directly placed composite restorations are a viable treatment modality to restore the worn dentition"

"Lack of posterior support was the main factor associated with failure.
It is recommended that missing posterior teeth are replaced to reduce anterior loading on composite restorations"

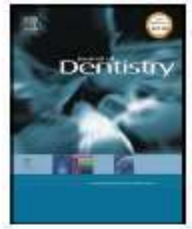
Best treatment for worn teeth?

Journal of Dentistry 48 (2016) 9–15

Contents lists available at ScienceDirect

Journal of Dentistry

journal homepage: www.intl.elsevierhealth.com/journals/jden



Review article

Rehabilitation of severely worn teeth: A systematic review

Mauro Elias Mesko[a], Rafael Sarkis-Onofre[a], Maximiliano Sérgio Cenci[a], Niek Johannes Opdam[b], Bas Loomans[b], Tatiana Pereira-Cenci[a,*]

[a] Graduate Program in Dentistry, Federal University of Pelotas, Pelotas, Brazil
[b] Radboud University Medical Center, Radboud Institute for Molecular Life Sciences, Department of Dentistry, Nijmegen, The Netherlands

ARTICLE INFO

Article history:
Received 18 September 2015
Received in revised form 4 March 2016
Accepted 5 March 2016

Keywords:
Systematic review
Direct composite
Indirect composite
Severe tooth wear
Clinical studies

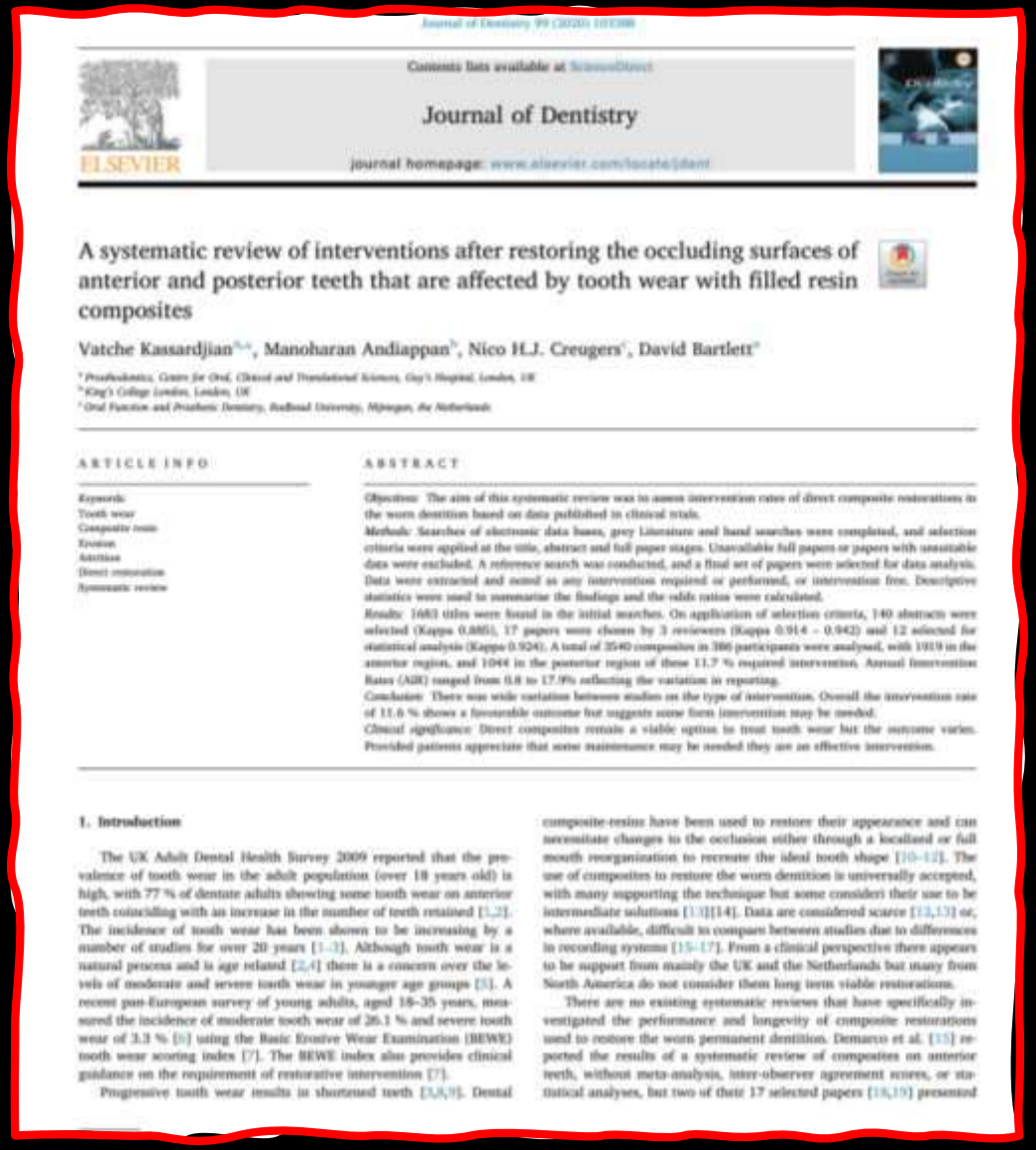
ABSTRACT

Objectives: The aim of this systematic review was to evaluate the treatment performance/longevity of dental materials/techniques indicated to restore teeth with severe wear.
Materials and methods: A systematic literature search was conducted to select retrospective studies (cohort and case series) and prospective studies that evaluated or compared techniques/materials to restore teeth with severe wear. A search was conducted in Medline (via Pubmed – June 2015) with no limits for publication year or language to identify clinical studies. Two reviewers independently selected studies, extracted data and assessed the risk of bias of randomized controlled trials included. The annual failure rate (AFR%) of restorations was calculated for each study.
Results: A total of 511 articles were found and 23 studies were eligible for full-text analysis; hand search included 7 more papers. From the 30 studies, 12 were eligible for the review. Most of these studies presented good performance of the restorations in teeth with severe wear. AFR ranged from 0.4% (microhybrid) to 26.3% (microfilled) for direct resin composite, 0% to 14.9% for indirect resin composite and 2.7% for porcelain veneers.
Conclusion: There is no strong evidence to suggest that any material is better than another. Direct or indirect materials may be feasible options to restore severely worn teeth.

Best treatment for worn teeth?

Considering this, rehabilitation with direct resin composites is undoubtedly more conservative than tooth preparations for partial or full indirect restorations and the limited data shows that this choice offers good clinical results and satisfied patients [17,18,28]. In the past, the rationale for treating patients with severe tooth wear was a full mouth rehabilitation with cast metal crowns [6] but the absence of well-designed clinical studies showing the performance of this technique for the rehabilitation of severe wear [6,40], combined with high cost and invasive technique, justifies to qualify this approach as less favorable.

The most recent systematic review



Journal of Dentistry

journal homepage: www.elsevier.com/locate/jdent

A systematic review of interventions after restoring the occluding surfaces of anterior and posterior teeth that are affected by tooth wear with filled resin composites

Vatche Kassardjian[a,*], Manoharan Andiappan[b], Nico H.J. Creugers[c], David Bartlett[a]

[a] Prosthodontics, Centre for Oral, Clinical and Translational Sciences, Guy's Hospital, London, UK
[b] King's College London, London, UK
[c] Oral Function and Prosthetic Dentistry, Radboud University, Nijmegen, the Netherlands

ARTICLE INFO

Keywords:
Tooth wear
Composite resin
Erosion
Attrition
Direct restoration
Systematic review

ABSTRACT

Objectives: The aim of this systematic review was to assess intervention rates of direct composite restorations in the worn dentition based on data published in clinical trials.

Methods: Searches of electronic data bases, grey Literature and hand searches were completed, and selection criteria were applied at the title, abstract and full paper stages. Unavailable full papers or papers with unsuitable data were excluded. A reference search was conducted, and a final set of papers were selected for data analysis. Data were extracted and noted as any intervention required or performed, or intervention free. Descriptive statistics were used to summarise the findings and the odds ratios were calculated.

Results: 1683 titles were found in the initial searches. On application of selection criteria, 140 abstracts were selected (Kappa 0.885), 17 papers were chosen by 3 reviewers (Kappa 0.914 – 0.942) and 12 selected for statistical analysis (Kappa 0.924). A total of 3540 composites in 386 participants were analysed, with 1919 in the anterior region, and 1044 in the posterior region of these 11.7 % required intervention. Annual Intervention Rates (AIR) ranged from 0.8 to 17.9% reflecting the variation in reporting.

Conclusion: There was wide variation between studies on the type of intervention. Overall the intervention rate of 11.6 % shows a favourable outcome but suggests some form intervention may be needed.

Clinical significance: Direct composites remain a viable option to treat tooth wear but the outcome varies. Provided patients appreciate that some maintenance may be needed they are an effective intervention.

1. Introduction

The UK Adult Dental Health Survey 2009 reported that the prevalence of tooth wear in the adult population (over 18 years old) is high, with 77 % of dentate adults showing some tooth wear on anterior teeth coinciding with an increase in the number of teeth retained [1,2]. The incidence of tooth wear has been shown to be increasing by a number of studies for over 20 years [1–3]. Although tooth wear is a natural process and is age related [2,4] there is a concern over the levels of moderate and severe tooth wear in younger age groups [5]. A recent pan-European survey of young adults, aged 18–35 years, measured the incidence of moderate tooth wear of 26.1 % and severe tooth wear of 3.3 % [6] using the Basic Erosive Wear Examination (BEWE) tooth wear scoring index [7]. The BEWE index also provides clinical guidance on the requirement of restorative intervention [7].

Progressive tooth wear results in shortened teeth [5,8,9]. Dental composite-resins have been used to restore their appearance and can necessitate changes to the occlusion either through a localised or full mouth reorganization to recreate the ideal tooth shape [10–12]. The use of composites to restore the worn dentition is universally accepted, with many supporting the technique but some consideri their use to be intermediate solutions [13][14]. Data are considered scarce [12,13] or, where available, difficult to compare between studies due to differences in recording systems [15–17]. From a clinical perspective there appears to be support from mainly the UK and the Netherlands but many from North America do not consider them long term viable restorations.

There are no existing systematic reviews that have specifically investigated the performance and longevity of composite restorations used to restore the worn permanent dentition. Demarco et al. [15] reported the results of a systematic review of composites on anterior teeth, without meta-analysis, inter-observer agreement scores, or statistical analyses, but two of their 17 selected papers [18,19] presented

1,683 papers, 17 selected

3,540 composites in 386 patients

CONCLUSIONS:
Annual Intervention Rate varied between 1% and 18%

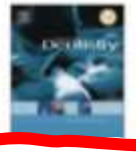
Direct composites remain a viable option to treat tooth wear but the outcome varies. Patients appreciate that some maintenance may be needed.

Hot off the press!

Contents lists available at ScienceDirect

Journal of Dentistry

journal homepage: www.elsevier.com/locate/jdent



Clinical performance of direct composite resin restorations in a
rehabilitation for patients with severe tooth wear: 5.5-year res

Shamir B. Mehta [a,b,*,#], Verônica P. Lima [a,c,#], Ewald M. Bronkhorst [a], Luuk Cri
Hilde Bronkhorst [a], Niek J.M. Opdam [a], Marie-Charlotte D.N.J.M. Huysmans [a], F
C. Loomans [a]

[a] Department of Dentistry, Radboud University Medical Center, Radboud Institute for Health Sciences, Nijmegen, The Netherlands
[b] Department of Conservative & MI Dentistry, Unit of Distance Learning, King's College London Faculty of Dentistry, Oral & Craniofacial Sc
London
[c] Graduate Program in Dentistry, Federal University of Pelotas, Pelotas, Brazil

ARTICLE INFO

Keywords:
Severe tooth wear
Restorative treatment
Tooth wear
Composite resin restorations
Survival
Clinical study
Interventions
Increase vertical dimension of occlusion

ABSTRACT

Objectives: To evaluate the 5.5-year performance of direct resin c
with severe tooth wear, requiring full-mouth rehabilitation.
Methods: A convenience sample of 34 patients were recruited to a
June 2013. The participants were provided 1269 full-mouth direct
5 experienced operators, using the DSO-technique. Treatment result
occlusion (VDO). Failure was assessed at three levels. Frequencies
survival curves and the effects of the relevant variables calculat
0.05).
Results: Annual failure rates (for all levels of failure, 'Level 3- ') of
for the anterior and posterior restorations with a mean observation
anterior restoration with the need for further appointments resulte
An evaluation of the performance of the premolar and posterior
lowered risks of certain types of failures, compared to the molar a
Conclusions: At 5.5 years, 2.3% of the overall restorations displ
restorations, posterior mandibular restorations and the anterior r
completion, were associated with significantly higher risks for fail
Clinical significance: Direct resin composite can offer an acceptab
severe, generalized tooth wear; molar restorations may require hig

1. Introduction

The term 'severe tooth wear' has been used to describe the presence of tooth wear with the substantial loss of tooth structure, with dentine exposure, and significant loss (≥1/3) of the clinical crown [1]. The condition of 'pathological tooth wear' is, however, used to refer to tooth wear that is atypical for the age of the patient, causing pain, discomfort, increasing complexity [1]. For an appropriate preventive plan must be prescribed, with periodic monitoring [1-3]. When the level of tooth wear is a concern for the patient and/ or the clinician, restorative intervention may be indicated. Where possible, restoration of the worn dentition should be undertaken in an 'additive,' minimally invasive manner; this approach may also help to facilitate contingency planning [1]. With an additive approach,

ABSTRACT

Objectives: To evaluate the 5.5-year performance of direct resin composite restorations, prescribed for patients with severe tooth wear, requiring full-mouth rehabilitation.
Methods: A convenience sample of 34 patients were recruited to a prospective trial between December 2010 and June 2013. The participants were provided 1269 full-mouth direct resin composite restorations (Clearfil AP-X) by 5 experienced operators, using the DSO-technique. Treatment resulted in an increase in the vertical dimension of occlusion (VDO). Failure was assessed at three levels. Frequencies of failure were analysed using Kaplan Meier survival curves and the effects of the relevant variables calculated with a multifactorial Cox regression ($p < 0.05$).
Results: Annual failure rates (for all levels of failure, 'Level 3- ') of $\leq 2.2\%$ and $\leq 2.9\%$ were respectively reported for the anterior and posterior restorations with a mean observation time of 62.4 months. The completion of an anterior restoration with the need for further appointments resulted in significantly more Level 2- & 3- failures. An evaluation of the performance of the premolar and posterior maxillary restorations showed significantly lowered risks of certain types of failures, compared to the molar and posterior mandibular restorations.
Conclusions: At 5.5 years, 2.3% of the overall restorations displayed catastrophic, (Level 1) failures. Molar restorations, posterior mandibular restorations and the anterior restorations requiring two further sessions for completion, were associated with significantly higher risks for failure.
Clinical significance: Direct resin composite can offer an acceptable medium-term option for the treatment of severe, generalized tooth wear; molar restorations may require higher maintenance.

Trevor's view:

Resin composite restorations may provide a minimal intervention and predictable treatment for (moderate) tooth wear, particularly in anterior teeth, ***provided that the correct materials are employed.***

Reattachment of the coronal fragment is a realistic alternative

- Good fragment retention, acceptable aesthetics
- blow
- Not a successful means of managing crown-root fractures

Approx 25% of 334 rebonded fragments were retained at 7 years after bonding

Andreasen FM, Noren JG, Andreasen JO, Englehardsen S. et al.,

Long term survival of fragment bonding in the treatment of fractured crowns. Quintessence Int.1995:26:669-681.

Attempting rebonding is the gold standard treatment!

Macedo GV, Ritter AV. Essentials of rebonding tooth fragments for the best functional and esthetic outcomes. Paediatric Dent.2009:31:110-116.

Eichelsbacher F, Donner W, Kleiber B, Schlagenhauf U. Periodontal status of teeth with crown-root fractures:results at two years after adhesive fragment reattachment. J.Clin.Periodontol.2009:36:905-911.

Murchison DF, Burke FJT, Worthington RB. Incisal edge reattachment: indications for use and clinical technique. Br.Dent.J.1999:186:614-619.

KEY WORDS

LEARNING OBJECTIVES

AUTHOR

IGOR R. BLUM

RESTORATION REPAIR AS A CONTEMPORARY APPROACH TO TOOTH PRESERVATION:

CRITERIA FOR DECISION MAKING AND CLINICAL RECOMMENDATIONS

ABSTRACT

Despite the growing body of evidence-based knowledge, evidence-based restoration repair is not always applied in the clinical setting. This article is intended to give an evidence-based insight into the indications, importance, benefits and long-term success of resin composite restoration repair, together with details of relevant operative techniques aimed at conserving as much sound tooth structure as possible.

Evidence-based success of repaired restorations

Numerous longitudinal clinical studies have shown that restoration repairs in permanent teeth are able to significantly increase the lifetime of restorations,[22,27-30] and come with reduced treatment time, lower costs, and lower risks of complications than total replacements.[12,31]

The evidence base for repair is building

KEY WORDS

LEARNING OBJECTIVES

AUTHOR

IGOR R. BLUM

RESTORATION REPAIR AS A CONTEMPORARY APPROACH TO TOOTH PRESERVATION:

CRITERIA FOR DECISION MAKING AND CLINICAL RECOMMENDATIONS

Format: Abstract

Send to

Clin Cosmet Investig Dent. 2014 Oct 17;6:81-7. doi: 10.2147/CCIDE.S53461. eCollection 2014.

Factors influencing repair of dental restorations with resin composite.

Blum IR[1], Lynch CD[2], Wilson NH[3].

Author information

Abstract

The presentation of patients with dental restorations that exhibit minor defects is one of the commonest clinical situations in the practice of general dentistry. The repair of such restorations, rather than replacement, is increasingly considered to be a viable alternative to replacement of the defective restoration. This paper considers factors influencing the repair of direct restorations, including indications and details of relevant techniques, based on the best available knowledge and understanding of this important aspect of minimal intervention dentistry. Practitioners who do not consider repair before deciding to replace restorations that present with limited defects are encouraged to consider including repair in the treatment options in such situations. The effective repair of direct restorations can greatly influence the rate of descent down the "restorative death spiral".

understanding of this important aspect of minimal intervention dentistry. Practitioners who do not consider repair before deciding to replace restorations that present with limited defects are encouraged to consider including repair in the treatment options in such situations. The effective repair of direct restorations can greatly influence the rate of descent down the "restorative death spiral".

Numerous longitudinal clinical studies have shown that restoration repairs in permanent teeth are able to significantly increase the lifetime of restorations,[22,27-30] and come with reduced treatment time, lower costs, and lower risks of complications than total replacements.[12,31]

The evidence base for repair is building

KEY WORDS

LEARNING OBJECTIVES

AUTHOR

IGOR R. BLUM

RESTORATION REPAIR AS A CONTEMPORARY APPROACH TO TOOTH PRESERVATION:

CRITERIA FOR DECISION MAKING AND CLINICAL RECOMMENDATIONS

Format: Abstract

Send to

Clin Cosmet Investig Dent. 2014 Oct 17;6:81-7. doi: 10.2147/CCIDE.S53461. eCollection 2014.

Factors influencing repair of dental restorations with resin composite.

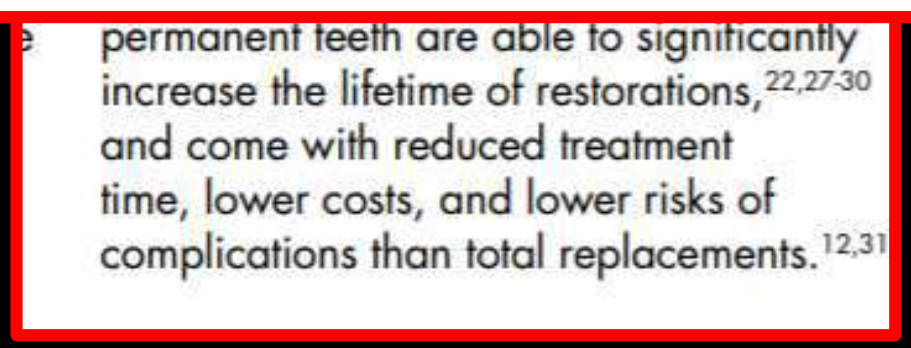
Blum IR[1], Lynch CD[2], Wilson NH[3].

Author information

Abstract

The presentation of patients with dental restorations that exhibit minor defects is one of the commonest clinical situations in the practice of general dentistry. The repair of such restorations, rather than replacement, is increasingly considered to be a viable alternative to replacement of the defective restoration. This paper considers factors influencing the repair of direct restorations, including indications and details of relevant techniques, based on the best available knowledge and understanding of this important aspect of minimal intervention dentistry. Practitioners who do not consider repair before deciding to replace restorations that present with limited defects are encouraged to consider including repair in the treatment options in such situations. The effective repair of direct restorations can greatly influence the rate of descent down the "restorative death spiral".

Blum and Ozcan stated unequivocally that “restoration replacement should be considered as the last resort when there are no other viable alternatives”.
“The literature on survival of repaired restorations concluded that numerous longitudinal clinical studies have shown that restoration repairs in permanent teeth are able to significantly increase the lifetime of restorations and the restored tooth unit”.



permanent teeth are able to significantly increase the lifetime of restorations,[22,27-30] and come with reduced treatment time, lower costs, and lower risks of complications than total replacements.[12,31]

The evidence base for repair is building

Repair of restorations is no longer considered to be “dodgy”

Review

Repair of restorations – Criteria for decision making and clinical recommendations

Reinhard Hickel, Katrin Brüshaver, Nicoleta Ilie*

Department of Restorative Dentistry, Dental School Ludwig-Maximilians-University, Munich, Germany

ARTICLE INFO

Article history:
Received 18 June 2012
Received in revised form 9 July 2012
Accepted 17 July 2012
Available online xxx

Keywords:
Replacement
Filling
Resin-based composite
Ceramic
Gold-metal

ABSTRACT

Objectives. In the last decade, repair of restorations has become more and more popular while teaching repair of restorations is now included in most universities in Europe and North America. The aim of this paper was therefore to systematically review the clinical and the in vitro aspects of repair of restorations by considering different restorative materials – resin-based composites, amalgam, glass-ionomer cements, ceramics or metals. The paper gives also an overview of the occurrences of teaching repair in different universities. Furthermore, the paper outlines criteria for decision making when to treat a defect restoration with refurbishment, repair, replacement or no treatment.

Data. The database search strategy for resin based composite restoration repair ($n=360$) and the following hand search ($n=95$) retrieved 455 potentially eligible studies. After de-duplication, 260 records were examined by the titles and abstracts. 154 studies were excluded and 106 articles were assessed for eligibility by analyzing the full texts. Following the same search and selection process, 42 studies for amalgam repair, 51 studies for cast, inlay or porcelain restoration repair and 8 studies for teaching were assessed for eligibility by analysis of the full texts.

Sources. Following databases were analyzed: Cochrane Library, MEDLINE, EMBASE, BIOSIS and PUBMED.

Study selection. Papers were selected if they met the following criteria: replacement, refurbishment or repair of resin composite restorations or amalgam restorations or inlay, cast restoration or porcelain repair. Clinical studies, in vitro studies and reports about teaching were included.

Conclusions. Repair of restoration is a valuable method to improve the quality of restorations and is accepted, practiced and taught in many universities. However, there is a need for methodologically sound randomized controlled long-term clinical trials to be able to give an evidence based recommendation.

Hickel R.et al. Repair of restorations. Dent.Mater. 2012:

Repair of restorations is no longer considered to be “dodgy”

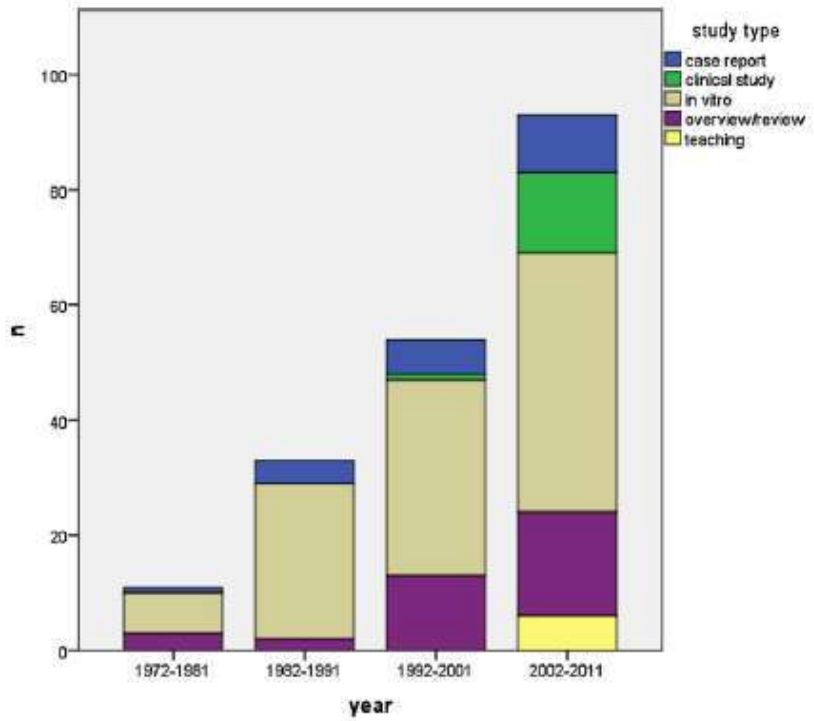


Fig. 3 – Frequency of publications about repair of restorations (resin based, amalgam, inlay, cast restoration and porcelain) selected in the paper, according to clinical and in vitro studies, reviews and teaching topics. Case reports were additionally considered.

Hickel R.et al. Repair of restorations. Dent.Mater.2012:

Longevity of repaired restorations

Opdam NJM et al., J.Dent.2012:40:829-835

JOURNAL OF DENTISTRY 40 (2012) 829–835

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: www.intl.elsevierhealth.com/journals/jden

Longevity of repaired restorations: A practice based study

Niek J.M. Opdam, Ewald M. Bronkhorst, Bas A.C. Loomans, Marie-Charlotte D.N.J.M. Huysmans*

College of Dental Science, Department of Preventive and Restorative Dentistry, Radboud University, Nijmegen Medical Centre, The Netherlands

- 1202 amalgam, 737 composite restorations
- 407 failed
- 246 repaired with composite and an etch & rinse bonding agent

Clinical
Repair

and composite restorations was 9.3% and 5.7% after 4 years (log-rank, $p = 0.001$). Restorations that were repaired due to fracture had a lower survival than restorations that were repaired due to caries (log-rank, $p = 0.006$).

The Cox-regression showed influence of the gender but no significant influence of material or reason for repair, indicating that the findings are a consequence of joint negative influences of investigated variables.

Conclusion: The present study shows that repairs can enhance the longevity of dental restorations considerably. Moreover, repairs on restorations failing due to caries have a better prognosis compared to repairs on restorations failing due to fracture.

Longevity of repaired restorations

Opdam NJM et al., J.Dent.2012:40:829-835

RESULTS

- 61% of repaired restorations still in service at 5 years
- Annual failure rates of repaired amalgams was 9.3%, for composites 5.7%
- Restorations which failed due to fracture had a lower survival than those which were repaired because of caries

Longevity of repaired restorations
…covered in Dental Update

Rationale for restoration repair

- Preservation of tooth structure
- Enhanced restoration longevity
- Reduction in harmful effects on the pulp
- Reduced treatment time
- Reduced cost to the patient
- Good patient acceptance
- No need for LA in majority of repairs
- Reduced risk of iatrogenic damage

A must read paper

RestorativeDentistry

David Green

Louis Mackenzie and Avijit Banerjee

Minimally Invasive Long-Term Management of Direct Restorations: the '5 Rs'

Abstract: The assessment and operative long-term management of direct restorations is a complex and controversial subject in conservative dentistry. Employing a minimally invasive (MI) approach helps preserve natural tooth structure and maintain endodontic health for as long as possible during the restorative cycle. This paper discusses how minimally invasive techniques may be applied practically to reviewing, resealing, refurbishing, repairing or replacing deteriorating/failed direct coronal restorations (the '5 Rs') and provides an update of contemporary MI clinical procedures.

CPD/Clinical Relevance: The assessment and long-term clinical management of deteriorating/failing direct restorations is a major component of the general dental practice workload and NHS UK budget expenditure for operative dentistry.

Dent Update 2015; 42: 413–426

What is a 'failing' restoration?

A failing restoration can be described as one that has suffered biomechanical defect or damage resulting in immediate or subsequent detrimental clinical consequences to the patient. This may affect the restoration alone (eg bulk fracture, staining etc), the supporting tooth structure (eg fractured cusps, new caries at the tooth-restoration surface (CARS) etc) or, more commonly, both, affecting the collective *tooth-restoration complex*. Such failure can present as obvious fractures of this complex, possibly detectable active caries associated with restoration/sealant surface (CARS, previously described as secondary or recurrent caries) or can be more subtle, such as marginal discoloration of an anterior aesthetic resin composite restoration or marginal ditching of a posterior restoration.

A number of clinical indices have against these criteria and given a score out of five, depending on the clinical findings. This classification has been proposed as a tool to evaluate and standardize new restorative materials, a method to determine if restorations require repair or replacement and a quality assessment tool for reviewing dental restorations. This classification has been shown to be more sensitive at determining differences between restorations than older classifications.[2] There are a number of challenges, which include the universal uptake of the new classification system and how the scoring

David Green, BSc(Hons) BDS(Hons) MFDS RCS(Ed), StR in Restorative

The 5Rs!

Reviewing
Resealing
Refurbishment
Repair

and, where necessary,
Replacement

Dent.Update 2015:42:413-426

You need an intraoral sandblaster and rubber dam!

The components of CoJet (3M ESPE)

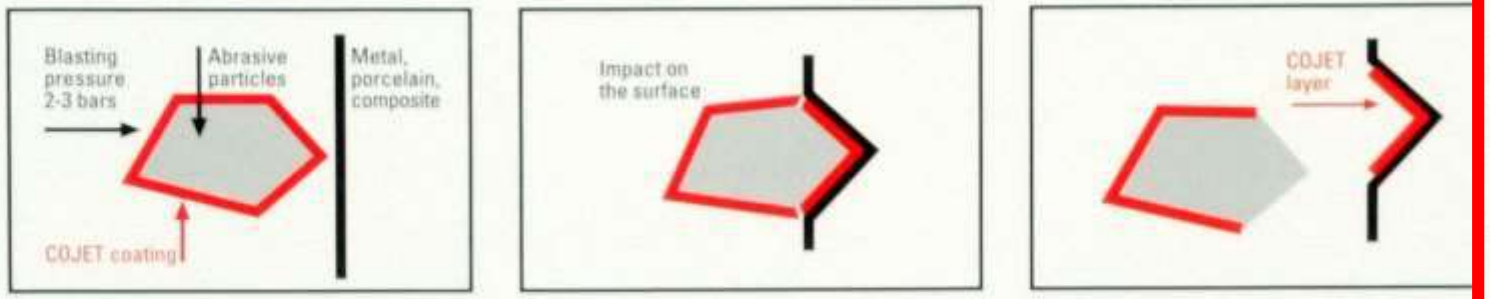
The sand is the most important part

Derived from Rocatec

How the CoJet™ Intraoral Adhesive Repair System works

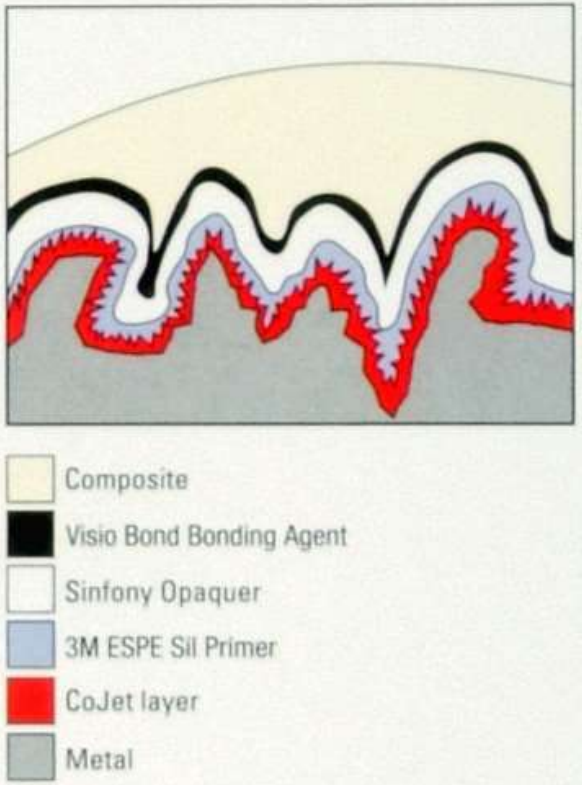
- Using the CoJet prep hand-held microblaster, the specially developed CoJet sand is blasted directly onto the metal, porcelain or composite surface requiring repair. During this process, the impact energy produces a ceramic-like coating on the treated surface (tribochemistry).

Tribochemical coating with CoJet sand



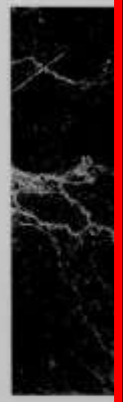
- Subsequent silanisation with 3M ESPE Sil and application of Visio™ Bond bonding agent produces a strong (chemical) and microgap-free bond between the treated surface and the restorative material.
- For optimum aesthetics, exposed metal surfaces are masked using Sinfony™ Opaquer.
- A restorative or veneering composite of your choice can then be applied, cured and finished.

Layer structure showing a metal framework treated with the CoJet ™ Intraoral Adhesive Repair System



Does Cojet work?

Critical Appraisal



INTRAORAL REPAIR OF FRACTURED CERAMIC RESTORATIONS

Author

Barry D. Hammond, DMD*

Associate Editor

Edward J. Swift, Jr., DMD, MS

Acknowledgment

William W. Brackett, DDS, MSD†

In numerous studies, it has been shown that the repair of fractures involving both porcelain and metal or tooth substrate is more problematic because of the different characteristics of each particular material. However, in the majority of studies within the past several years, the most predictable bond strength to varying substrates has been shown following surface treatment with CoJet-Sand. Air-abrasion using the

roughening of ceramic surfaces will result in higher tensile bond strengths.

Materials and Methods: Ceramic blocks were fabricated from three different materials—a feldspathic veneering porcelain (Eris, Ivoclar Vivadent, Schaan, Liechtenstein), a leucite-reinforced pressable porcelain (IPS Empress, Ivoclar

surface treatments consisting of polishing, airborne-particle abrasion, acid-etching, and a combination of abrasion and etching were investigated. Prior to any surface treatment, all ceramic blocks were polished with silicon carbide abrasive paper under running water. The polished group received no further treatment and served as the control group. Etching was

abraded groups was performed using 50-μm Al_2O_3 at a pressure of 35 psi. After the surface roughening procedures, the ceramic surfaces were thoroughly cleaned via a pressure-vaporized steam cleaner. Silane treatment was excluded to minimize the number of variables. An adhesive resin (Heliobond, Ivoclar Vivadent) was applied, lightly thinned

*Assistant Professor, Department of General Dentistry, Medical College of Georgia, Augusta, GA, USA
†Professor, Department of Oral Rehabilitation, Medical College of Georgia, Augusta, GA, USA

DOI 10.1111/j.1708-8240.2009.00275.x

Trevor’s view:

Cojet appears to provide a predictable means of repair of metal-ceramic restorations, provided that there is not a defect in the metal substructure

Technique Tips – Repairing Fractured Metal-Ceramic Restorations using Tribochemical Impregnation

The fracture of the ceramic from a metal-ceramic restoration may often lead to an emergency attendance, because of compromised appearance or because the fractured restoration had rough margins, which were traumatizing the soft tissues. Causes of such fractures include, trauma (occlusal or physical), unsupported ceramic (which could be extrapolated to poor laboratory design), and/or insufficient rigidity in the metal substructure of the crown. It could be expected that the latter would be a cause of an early fracture, while the other causes could occur at any time in the life of the crown. Previous methods of attempting repair of such restorations used so-called chemically-active resins, an example of which was 4-methacryloxyethyl trimellitate anhydride (4-META).[1]

It is the aim of this short paper to describe a method of repairing fractured metal-ceramic restorations using the Cojet (3M ESPE) system. This system is based upon the Rocatec laboratory system (3M ESPE, Germany) which has been in use since 1989 for bonding resin composite to metal surfaces. It relies on sandblasting the metal surface with 30 microns aluminium oxide particles modified with silicic acid at a pressure of 0.25 MPa at a distance of 1cm (Cojet sand in the intra-oral kit).[2] This causes a tribochemical (heat) reaction at the metal surface, with spot heating of up to 1,000 °C, causing silica particles to be impregnated into the surface to a depth of 15 microns. This enables the surface to be treated with the silane solution which facilitates bonding to a resin-based material, with a resin-based opaquer also being included. The intra-oral version of this system is known as Cojet (3M ESPE).

In the illustrated case report, a 35 year-old woman presented following trauma, having lost ceramic from two metal-ceramic crowns (Figure 1). The patient's medical history included bulimia during her teenage years, which led to her upper anterior teeth receiving metal-ceramic crowns as a 'treatment' for excessive toothwear. Clinical examination indicated that the crown margins were intact, so it was decided that a repair using Cojet should be attempted.

The shade of the crowns was taken, and the defective crowns were isolated with rubber dam. The patient was provided with a nosepiece and protective eyewear. The exposed metal surfaces and surrounding ceramic were sandblasted using an intra-oral sandblaster filled with Cojet Sand, then with silane, the Cojet opaquer, ESPE-Sil (both 3M ESPE) and then resin composite. The repair was finally finished and polished using abrasive discs and impregnated rubber points (Figure 2).

While long-term reports of the success of such treatment are sparse, one review reports positive findings,[3] and it may be considered that the trauma to the hard dental tissues is substantially less when the technique described above is utilized, when compared with the removal of the crowns and their replacement. In short, repair is always worth a try!

Figure 1. Fractured crowns isolated and sandblasted using Cojet sand. The metal presents with a matt surface.

Figure 2. Repaired crowns following application of silane, opaquer and resin composite: one year review.

References

1. Burke FJT. Repair of metal-ceramic restorations using an abrasive silica-impregnating technique: two case reports. *Dent Update* 2002; **29**: 398–402.
2. Oczan M, Pfeiffer P, Nergiz I. A brief history and current status of metal and ceramic surface-conditioning concepts for resin bonding in dentistry. *Quintessence Int* 1998; **29**: 713–724.
3. Hammond BD. Intraoral repair of fractured ceramic restorations. *J Esthet Rest Dent* 2009; **21**: 275–277.

FJT Burke, DDS, MSc, MDS, MGDS, FDS (RCS Edin), FDS RCS (Eng), FFGDP (UK), FADM, Primary Dental Care Research Group, University of Birmingham School of Dentistry, 5 Mill Pool Way, Pebble Mill, Birmingham B5 7EG, UK.

Read more about it!

Trevor’s view:

Repair of restorations
should always be
considered,
but defining the reason
for failure is important ,
if future failure
is to be avoided

Another way of keeping cavities small;
sealing caries in rather than removing it all

Ultraconservative and cariostatic sealed restorations: Results at year 10

Mertz-Fairhurst EJ, Curtis JW, Ergle JW, Rueggeberg FA, Adair SW

JADA.1998:129:55-65

156 pairs of restorations, 85 evaluated at year 10

Three groups of restorations in frankly cavitated lesions :

Conventional amalgam,

Conservative amalgam/sealed,

Cariostatic sealed composite

… did not remove undermined enamel or caries below the bevel”

Ultraconservative and cariostatic sealed restorations: Results at year 10

Mertz-Fairhurst EJ, Curtis JW, Ergle JW, Rueggeberg FA, Adair SW

JADA.1998:129:55-65

Restorations assessed using USPHS criteria

- 12 failures from 85 sealed composites (14%) (caries only at margin of 1 restoration)
- 1 failure from 44 sealed amalgams (2%) (caries only at margin of 1 restoration)
- 7 failures from 41 unsealed amalgams (17%) (caries at margins of all 7 failed restorations)

Ultraconservative and cariostatic sealed restorations: Results at year 10

Mertz-Fairhurst EJ, Curtis JW, Ergle JW, Rueggeberg FA, Adair SW

JADA.1998:129:55-65

CONCLUSIONS

- Undermined enamel may be stronger than we believed
- Class I amalgams should be sealed after placement
- Bonded and sealed resin composite restorations placed over frankly cavitated lesions arrested the progress of these lesions over a period of 10 years

How “clean” must a cavity be before restoration? Kidd EAM.

Caries Res.2004:38:305-313

- This review makes uncomfortable reading for those of us teaching operative dentistry
- There is no clear evidence that it is deleterious to leave infected dentine, even if it is soft and wet, prior to sealing the cavity
- This cautious approach may be preferable to vigorous excavation because fewer pulps will be exposed

Edwina Kidd's paper in Dental Update on this topic is essential reading

Cariology


Edwina Kidd


Ole Fejerskov


Bente Nyvad

Infected Dentine Revisited

Abstract: Dentine becomes infected as a result of caries lesion formation on root surfaces and when lesions progress following cavitation of enamel lesions. However, this infection is unimportant because the driving force for lesion formation and progression is the overlying biofilm. This explains why root surface caries can be controlled by mechanical plaque control and fluoride, and restorations are not needed to arrest these lesions. Similarly, the infected dentine in cavitated coronal lesions does not have to be removed to arrest the lesion. If the lesion is either accessible or opened for cleaning by the patient or parent, the lesion can be arrested. Sealing of infected dentine within the tooth, either by a Hall crown in the primary dentition or by partial caries removal prior to placing a well-sealed filling, will also arrest the lesion. When restoring deep lesions in symptomless, vital teeth, vigorous excavation of infected dentine is likely to expose the pulp and make root canal treatment necessary. Thus 'complete excavation' is not needed and should be avoided.

CPD/Clinical Relevance: Root surface caries can be arrested by cleaning and fluoride application. Restorations are not essential. Vigorous excavation of softened dentine in deep cavities of symptomless, vital teeth is contra-indicated. It is not needed and increases the risk of

Kidd E, Fejerskov O, Nyvad B. Infected dentine revisited. Dent.Update.2015:42:802-809.

CONCLUSIONS

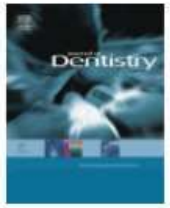
When restoring deep caries lesions in vital, asymptomatic teeth, vigorous excavation is likely to expose the pulp. This complete excavation is not needed and should be avoided.
Always produce a sound cavity margin for bonding.

JOURNAL OF DENTISTRY 43 (2015) 1–15

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.intl.elsevierhealth.com/journals/jden



Review

Effects of using different criteria for caries removal: A systematic review and network meta-analysis

Falk Schwendicke[a,*], *Sebastian Paris*[a], *Yu-Kang Tu*[b]

[a] *Department of Operative and Preventive Dentistry, Charité – Universitätsmedizin Berlin, Aßmannshauser Str. 4-6, 14199 Berlin, Germany*

[b] *Institute of Epidemiology & Preventive Medicine, College of Public Health, National Taiwan University, Taipei, Taiwan*

ARTICLE INFO

Article history:
Received 29 September 2014
Received in revised form
10 October 2014
Accepted 13 October 2014

Keywords:
Bayesian
Carisolv
Criteria
Dental
Excavation
Fluorescence

ABSTRACT

Objectives: Conventionally, caries excavation is performed until only hard dentine remains, while more selective and reliable criteria might be available. We aimed at systematically comparing the effects of using different excavation criteria via network meta-analysis.

Sources: Electronic databases were searched for randomised or non-randomised clinical trials (RCTs/NRCTs) evaluating excavation of cavitated lesions.

Data: Criteria were divided into six groups: Excavation until pulpo-proximal dentine on the cavity floor was (1) either hard on probing, (2) slightly softened on probing, (3) not stainable by caries-detector-dye, or until (4) self-limiting polymer burs, (5) fluorescence-assisted devices or (6) chemo-mechanical gels indicated termination of the excavation. Evaluation of risk of complications, risk of pain/discomfort, excavation time, and number of remaining bacteria were then undertaken using Bayesian network meta-analysis.

Study selection: 28 studies (19 RCTs, 9 NRCTs) with 1782 patients (2555 lesions), most of them investigating primary teeth, were included. Risk of complications was highest when excavating until only non-stainable dentine remained, and lowest when not attempting to remove all softened dentine. Risk of pain significantly decreased if self-limiting chemo-mechanical excavation or fluorescence-assisted lasers were used instead of excavating until all dentine was hard. When not attempting to remove all softened dentine, the time required for excavation was shortest, whilst the greatest number bacteria remained.

Conclusions: Not attempting to remove all softened or stainable dentine might reduce the risk of complications. Data regarding self-limiting excavation is insufficient for definitive conclusions. Excavation criteria should be validated against clinically relevant outcomes.

Clinical significance: Given current evidence, dentists might not need to attempt excavation until only hard dentin remains in proximity to the pulp. Instead, their choice of excavation criterion or method should be guided by clinical requirements and outcomes.

Removal of all softened biomass until only hard dentine remains was clinically ineffective

No studies indicated that complete excavation had any advantages to removing only soft dentine

Not attempting to remove all softened dentine could reduce the risk of complications

Trevor’s view:

Removal of the caries process followed by the sealing of the restoration seems to make sense. Size matters in terms of cavity depth. But, only proven for occlusal lesions.

Another way of managing deep caries in a vital tooth

Biodentine™

Bioactive Dentine Substitute

ACTIVE BIOSILICATE TECHNOLOGY

septodont

Biodentine™

Advantages & disadvantages

Advantages

Maintains pulp vitality

Biocompatibility

Long working time

Technique insensitive

Suitable for use with the “thumb” technique

Disadvantages

Long working time

Idiosyncratic handling

Mixing sensitive

Finding it in the capsule

Technique Tips – A 'Get Out of Jail' Material

Figure 1. Radiograph shows deep caries UR67, in patient with high caries activity.

Figure 3. Biodentine restorations at placement.

Figure 2. Deep caries with exposure risk.

Figure 4. Restorations at 9 month review.

The treatment of deep caries lesions may be fraught with difficulty, and total removal of deep caries in an asymptomatic tooth may result in a pulp exposure. The sealing of caries into the tooth has been suggested following the work of Mertz-Fairhurst *et al*,[1] but the recent introduction of a material (*Biodentine*, Septodont, UK), which has demonstrable dentine repair properties,[2,3] may be of value. This material is composed of a purified tricalcium silicate powder which is mixed with water in a capsule, with the reaction releasing calcium hydroxide.

Deep caries was noted on a bitewing radiograph (Figure 1) in a number of otherwise symptom-free teeth in a 22-year-old female patient with high caries activity. The maxillary 1st and 2nd molar teeth tested vital. After removal of wet and infected dentine, it was decided that a pulpal exposure was likely if excavation was to be continued (Figure 2). Accordingly, excavation was stopped and *Biodentine* placed in the cavities and, after 15 minutes' setting time, basic carving could be carried out (Figure 3). After 9 months, the restorations were intact (Figure 4) and the tooth symptom free. A decision will be made in due course regarding the need for replacement of the restorations and whether removal of the remaining caries will be carried out, or simply that the restorations be resurfaced with resin composite.

References

1. Mertz-Fairhurst EJ, Curtis JW, Ergle JW, Rueggeberg FA, Adair SW. Ultraconservative and cariostatic sealed restorations: results at year 10. *J Am Dent Assoc* 1998; **129**: 55-65.
2. Laurent P, Camps J, About I. Biodentine induces TGF-b1 release from human pulp cells and early dental pulp mineralisation. *Int Dent J* 2011; doi:10.1111/j.1365-2591.2011.01995.
3. Atmeh AR, Chong EZ, Richard G, Festy F, Watson TF. Dentin-cement interfacial interaction: calcium silicates and polyalkenoates. *J Dent Res Online* doi:10.1177/0022034512443068.

F J Trevor Burke, DDS, MSc, MGDS FDS RCS(Edin), FDS RCS(Eng), FFGDP FADM Professor of Dental Primary Care, University of Birmingham School of Dentistry, St Chad's Queensway, Birmingham B4 6NN, UK.

My conclusion

Size matters – for NHS dentistry

Publishing Director
Stuart Thompson
Production Manager
Maria Ricketts
Design/Layout
Nicola Newman
Illustrator
Richard Taylor
Chairman
John Siebert

Subscription Information
Inland £75 Student £29
Europe £88
Overseas £100
Airmail £110
Vocational/Retired Dental Practitioner £55
10 issues per year
Single copies £9 (Overseas £10)
Subscriptions cannot be refunded.

For all changes of address and subscription enquiries please contact:
Dental Update Subscriptions
Proact Ltd, Creykes Court,
5 Craigie Drive,
Plymouth PL1 3JB
Tel: 01752 312140
Fax: 01752 313162
Email: postmaster@proactmarketing.co.uk
All subscriptions should be made payable to George Warman Publications (UK) Ltd.

Binders (can hold 10 issues)
UK £8.75 Overseas £12.00
Available from the address above.

Information for Authors
Dental Update invites submission of articles pertinent to general dental practice. Articles should be well-written, authoritative and fully illustrated. Manuscripts should be prepared following the *Guidelines for Authors* published in the January/February issue (additional copies are available from the Editor on request). Authors are advised to submit a synopsis before writing an article.
The opinions expressed in this publication are those of the authors and are not necessarily those of the editorial staff or the members of the Editorial Board.
The journal is listed in *Index to Dental Literature*, *Current Opinion in Dentistry*, *MEDLINE* and other databases.

All articles published in *Dental Update* are subject to review by specialist referees in the appropriate dental disciplines.

Member of the

COMMENT

Dawn or disaster?

F.J. Trevor Burke

Readers in the UK cannot have failed to hear that fundamental changes are planned in April 2005 in England for the state-run and partially state-funded dental service, presently known as the General Dental Services (GDS). The GDS has been in existence since 1948 and has presided, amongst other factors, over an enormous improvement in the oral health of the population, all at a cost which is the envy of ministers of health worldwide, with the dental practitioners operating within the GDS providing treatment at a cost per item which is lower than anywhere in the developed world. The fee-per-item remuneration for this service provided treatment in the 1940s to 1990s in an efficient manner but, latterly, was criticized because it was a national fee scale not sensitive to local variations in the cost of running a dental surgery and because it was perceived by some that the system encouraged dentists to over-prescribe treatment. Perhaps a more robust criticism was that the fee-per-item approach failed to reward a preventive and minimal-intervention approach that was becoming more appropriate to the falling disease levels and more achievable with new technology, such as the bonding of resin-based materials to tooth. A 'New contract' was introduced in 1990 in which dentists were encouraged to register patients on their lists but, famously, this hit the rocks in 1992 because of a failure of government to fund the patients enticed to dentists' lists.

What is currently known is that the new system, in 2005, will be administered locally by Primary Care Trusts (PCTs) rather than centrally and that the organization which administers the GDS (the Dental Practice Board [DPB]) will be disbanded, although it will become a Special Health Authority, possibly with increased duties which include those which it holds at present. Subsequent to this, the vast collection of data at the DPB, presently being used to produce the largest database for research into longevity of restorations, will be lost. From a government viewpoint, the lack of a requirement for the dentists still operating in the new NHS to record treatment data will mean that there will be difficulty in satisfying the taxpayer, by means of bodies such as the National Audit Office, that they are receiving value for money. What also is known is that dentists operating the new state dental service will be paid a regular monthly amount and that this will be based on previous earnings.

What is not known is how ready the PCTs will be for their new challenge, given that most have little hands-on experience in dental matters. What also is not known is what will happen to the patient who has not attended a dentist for several years and who is in need of substantial amounts of dental treatment. Will the dentist under these new arrangements be keen to take on a mouthful of decay and periodontal disease, rather than maintaining a practice of well conserved and controlled mouths? Another unknown is how patient charges will be collected. As the newly salaried dentist may not recall his/her patients as frequently as when they were paid fee-per-item, attendances will be down and patient charges won't be collected. As the government has guaranteed the dentists' earnings for a time, it would seem that it will be the taxpayer who will have to bear the deficit.

Another unknown is the question of what happens a few years after the introduction of the new scheme, when it is apparent that dentists operating under the new arrangements are not producing anything like as many patient treatments or patient visits as previously. This would not be a surprise, given that salaried workers rarely produce as much as those who are incentivized by piecework rates. Will this result in a pay cut?

2004

Authors' Information
Dental Update invites submission of articles pertinent to general dental practice. Articles should be well-written, authoritative and fully illustrated. Manuscripts should be prepared following the Guidelines for Authors published in the April 2005 issue (additional copies are available from the Editor on request). Authors are advised to submit a synopsis before writing an article. The opinions expressed in this publication are those of the authors and are not necessarily those of the editorial staff or the members of the Editorial Board. The journal is listed in *Index to Dental Literature*, *Current Opinion in Dentistry*, *MEDLINE* & other databases.
Subscription Information
Full UK £144 | Europe £177 | Airmail £192
Retired GDP/Vocational Trainee/DCP £85
Student (Undergraduate) £49 (Foundation Year) £95
11 issues per year
Single copies £23 (Europe £27 | ROW £33
Subscriptions cannot be refunded.
For all changes of address and subscription enquiries please contact:
Dental Update Subscriptions
Mark Allen Group, Unit A 1-5, Dinton Business Park, Catherine Ford Road, Dinton, Salisbury SP3 5HZ
FREEPHONE: 0800 137201
Main telephone (inc. overseas): 01722 716967
E: subscriptions@markallengroup.com
Managing Director: Stuart Thompson
Creative Manager: Lisa Dunbar
Design Creative: Alexander Lee
Dental Update is published by George Warman Publications (UK) Ltd, which is part of the Mark Allen Group.
GEORGE WARMAN PUBLICATIONS (UK) LTD
Unit 2, Riverview Business Park, Walnut Tree Close, Guildford, Surrey GU1 4UX
Tel: 01483 304944, Fax: 01483 303191
email: astrould@georgewarman.co.uk
website: www.dental-update.co.uk
The Dental Faculty of the Royal College of Physicians and Surgeons of Glasgow offers its Fellows and Members *Dental Update* as an exclusive membership benefit.
ABC
DU ISSN 0305-5000

Trevor Burke

UDAs remain a broken currency

The Unit of Dental Activity (UDA) remains the currency by which dentists operating in the NHS system in England and Wales are paid. Introduced in 2006, it took only three years before a report roundly condemned these as an inappropriate method for paying dentists.[1]

I have to report that, sadly, the Chair of the group who produced the report, Professor Jimmy Steele, recently passed away and his untimely passing has stolen, from UK dentistry, one of its cleverest, most clear-thinking minds. Our thoughts and prayers are with his family. This sad event has removed a person who sought to devise a more equitable system for paying dentists in England and Wales and it is to be hoped that the momentum for change will not be stalled by his passing.

We like case studies in *Dental Update*. Here I report three related to UDAs. First, I saw a patient who had been injured when a car reversed into her as she attempted to cross a road. Her UL1 was avulsed, and UL2 fractured. There was a family wedding shortly after this unfortunate incident so, quite rightly, the dentist whom she attended made the patient (who was exempt from payment) a one tooth partial acrylic denture: 12 UDAs, minimal laboratory fee. The UL2 was, in my opinion, restorable (large composite or, at worst, a crown) but, shortly after the wedding, it was extracted and a new partial upper immediate denture was placed: another 12 UDAs, minimal lab fee. Two months later, the patient complained that the denture was loose and another was made: another 12 UDAs, minimal lab fee. When I saw the patient, her teeth were covered in plaque and there were heavy calculus deposits in many areas. On being asked, the patient advised that she had not received any scaling and polishing or oral hygiene instruction during the three courses of treatment in which the dentures were made: all that seemingly mattered was the multiple gathering of 12 UDAs.

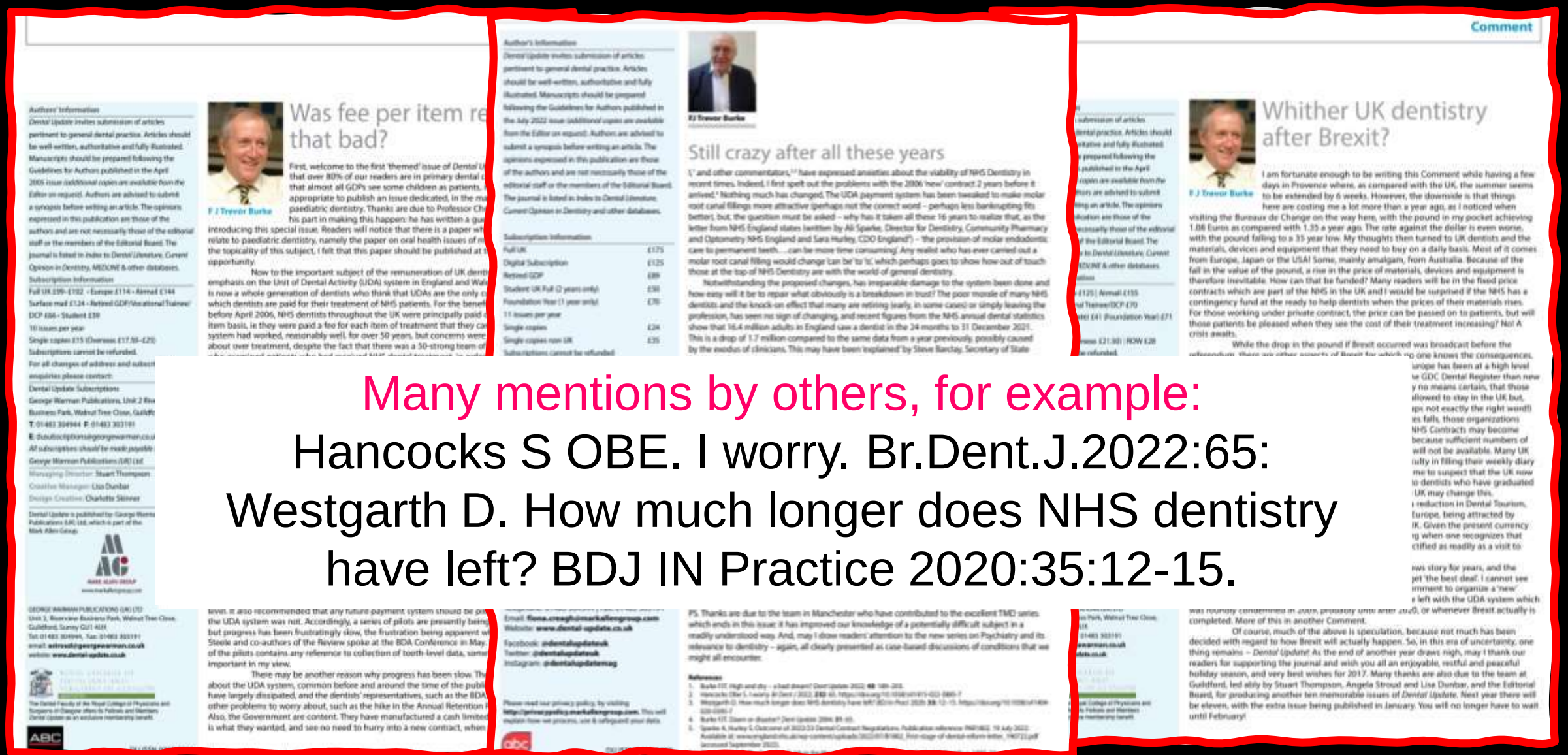
In the second case, a patient (again exempt from payment) attended a dentist who worked for a large corporate. She was surprised that she had been unable to see either of the previous two dentists who had previously treated her and with whom she had built up a good relationship. She was advised that both had left. Despite attending for a routine 'check-up' with no symptoms, the new dentist advised that she was suffering from temporomandibular joint problems and prescribed a soft night bite guard (NBG) for the upper arch: 12 UDAs, minimal lab fee. She never wore the NBG but, on re-attending for a subsequent course of treatment, she was prescribed a further NBG guard for the lower arch: another 12 UDAs, minimal lab fee. One could ask why the patient did not question the dentist more regarding her treatment or, indeed, confront him regarding this overtreatment: all that happened was that she contacted me. I hope that cases 1 and 2 are isolated incidents, as I am sure that the majority of dentists continue to work in an ethical way, despite the system.

Case study 3 relates to an ethical dentist who had a child-only NHS contract, this being unusual at the present time, I am told. She has worked hard on prevention for her child patients, and employs an oral health educator. She has been successful in her preventive strategy, so has 'generated' a shortfall in her UDA target because the majority of her treatments achieve 1 UDA because her patients require no treatment, rather than achieving the 3 UDAs which are awarded when restorations are needed. A totally perverse incentive which needs fixing.

Sadly, there is now a whole generation of dentists who think that UDAs are the only currency by which dentists are paid for their treatment of NHS patients. By coincidence, I wrote about this in the pre-Christmas issue of *Dental Update* two years ago,[2] writing '*Perhaps the new contract will seem clearer a year on*'. This is not the case, even after two years. Pilots for a potential new system of payment have been amended and are still ongoing. The Government are not in a hurry to change how dentists are being paid: they manufactured a cash-limited system, which is what they wanted. They see no need to hurry into a new contract, when few are complaining and (some) dentists are making massive amounts of money from treatments, as described in the first two cases. The ethical dentists are doing their best but some, as described in case study 3, are suffering. I apologize for discussing a system which relates only to England and Wales, when many readers are not from there. For those of you not afflicted with the UDA system, count

2017

Also mentioned in…



Many mentions by others, for example:

Hancocks S OBE. I worry. Br.Dent.J.2022:65:

Westgarth D. How much longer does NHS dentistry have left? BDJ IN Practice 2020:35:12-15.

2015 2022 2016

Have we gone below the critical mass? Size matters.

HEALTH

Half of dentists have cut back on their NHS work

By Paul Gallagher
HEALTH CORRESPONDENT

Half of dentists have reduced their NHS work, according to the British Dental Association (BDA), which warned more will follow as the sector plunges further into crisis.

The BDA said the exodus of dentists from the health service is going unseen in official figures. Its new survey found that more than half of dentists in England (50.3 per cent) report having reduced their NHS commitment since the start of the pandemic – by 27 per cent on average.

This movement is not tracked in official workforce data, which counts heads not commitment, and where dentists doing one NHS check-up a year carry the same weight as an NHS full-timer, the BDA said.

The proportion reporting their intention to reduce – or further reduce – the amount of NHS work they undertake stands at 74 per cent, the survey of 1,921 general dental practitioners in England showed.

Some 43 per cent indicated they were likely to go fully private and 42 per cent said they were likely to change career, or seek early retirement. More than one in 10 (12 per cent) said they were likely to move to practice abroad.

The Commons Health Committee is currently holding an inquiry into the crisis in the service, where it has become increasingly difficult for people to access a dentist.

A recent investigation found that nine in 10 NHS dental practices are not accepting new adult patients and the BDA has stressed that both the Government and the opposition now have a duty to set an urgent plan of action.

Shawn Charlwood, chair of the BDA's General Dental Practice Committee, said: "This is a warning from this profession. NHS dentistry is running out of road. Every day a broken system remains in force we lose dentists, while millions struggle to access care.

"This crisis won't be fixed with soundbites or tweaks at the margins. To turn the corner, we need a plan based on real reform and fair funding."

Up to £400m of NHS dentistry's "already inadequate" budget is set to be lost from the front line, the BDA said, as dentists are penalised for failing to hit contractual targets. This money is not ring-fenced and will probably be redistributed to balance other budgets elsewhere in the NHS.

The Department of Health and Social Care said: "We are working to improve access to NHS dental care by investing more than £3bn a year but we know there is more to do."

Rishi Sunak unveiled a five-point plan to end the access crisis last summer, but the BDA said that no element of it has been taken forward.

2 weeks ago

THE "DAUGHTER TEST" IN ELECTIVE ESTHETIC DENTISTRY

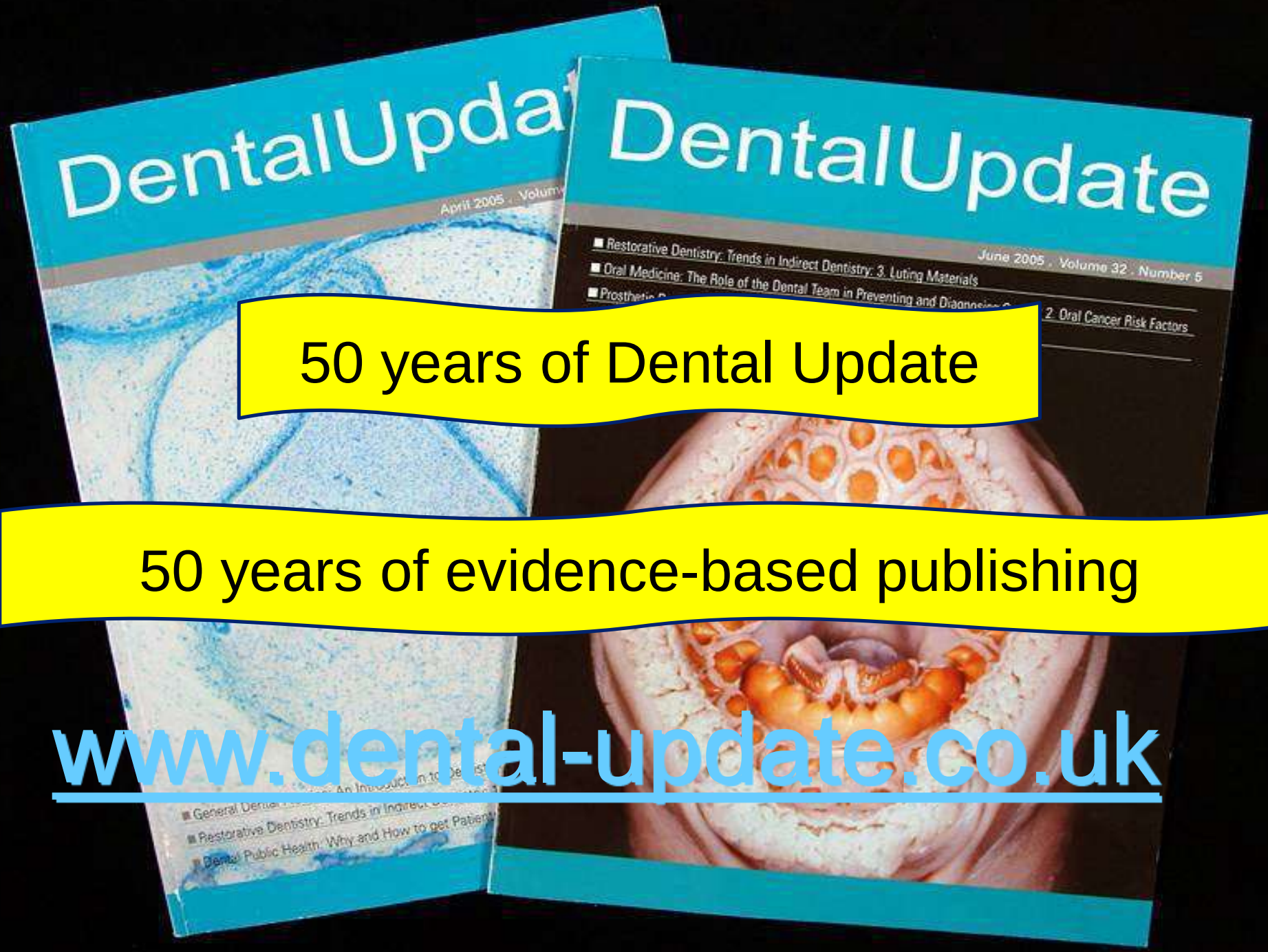
We read with interest the excellent overview of the 25-year status of porcelain laminate veneers by Dr. Mark Friedman[1] and agree with his statement "It is unfortunate that some members of our profession misrepresent porcelain veneer restorations as if they were completely innocuous to the dentition." It is not our intention to initiate a witch hunt on the porcelain veneer technique but to express considerable disquiet regarding the seemingly

dentat
modes
sion w
origina
son[2] a
view t
compo
preferr
these h
succes
positio
restora
the mo
patient

The fallback position is something that always should be considered, given that no restoration lasts forever. Common sense and experience prove that this fallback position is much better with restorations that do not involve cutting away of residual sound tooth substance, especially when this is already reduced because of wear.

It may be timely now to introduce an unscientific but potentially very relevant test, which might be of help in elective esthetic treatment planning, especially if this planning involves the elective loss of tooth tissue. This is the "Daughter Test." This asks the question "Knowing what I know about what is involved with this proposed dentistry, would I carry out this treatment on my own daughter's teeth?" Variations on this test include "Would I have this treatment carried out on my own teeth, my children's teeth, or my partner's teeth?" A negative response should prompt a radical rethink and probably initiate a change of plan involving a more sensible and less destructive approach with which the operator and his/her patient and family are more comfortable because it addresses the health of the teeth and the patient in the much longer term.

Burke FJT, Kelleher MGD J.Esthet.Restor.Dent.2009:21:143-145

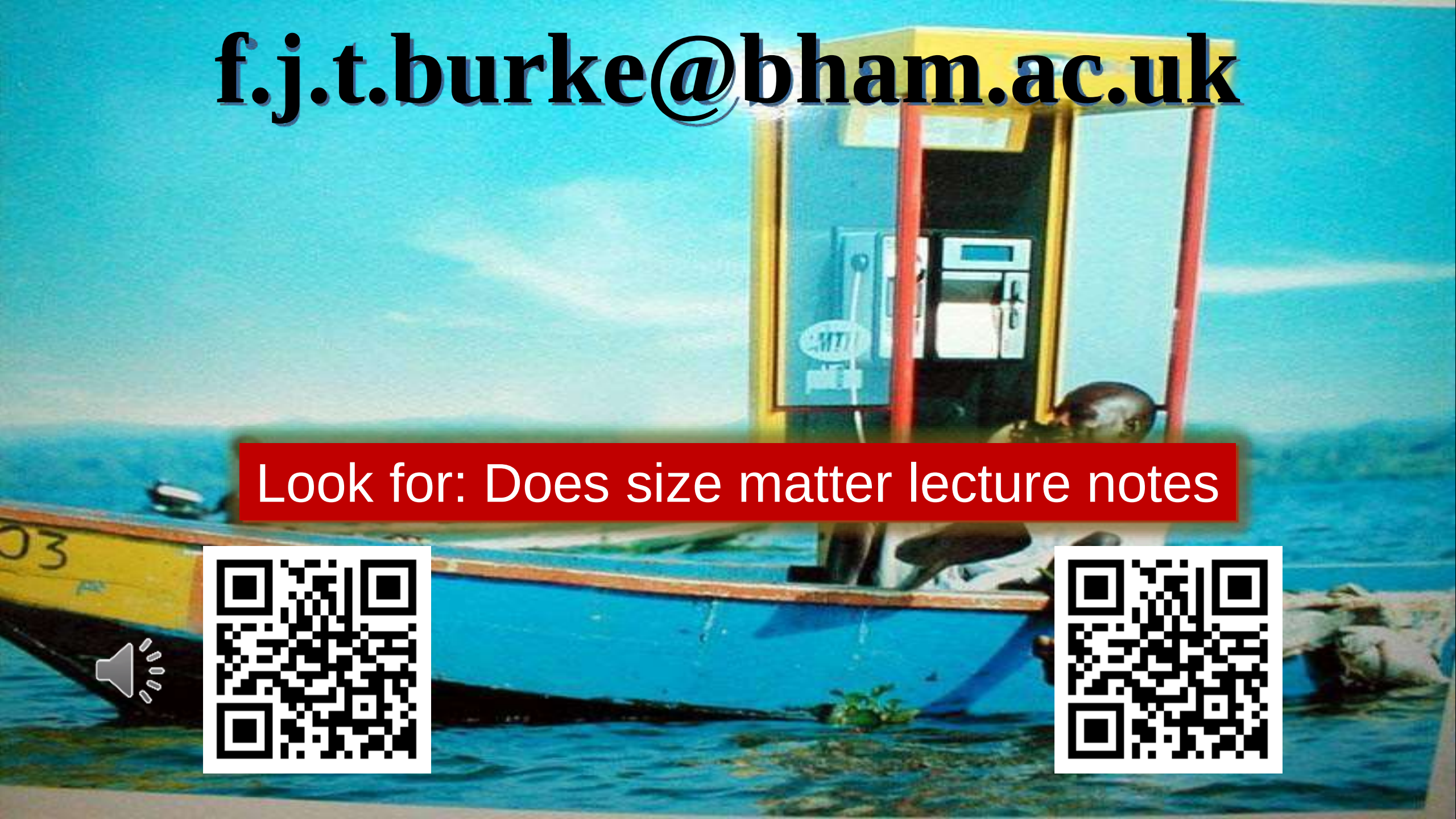

DentalUpdate
April 2005 . Volume
DentalUpdate
June 2005 . Volume 32 . Number 5
Restorative Dentistry: Trends in Indirect Dentistry: 3. Luting Materials
Oral Medicine: The Role of the Dental Team in Preventing and Diagnosing
2. Oral Cancer Risk Factors
50 years of Dental Update
50 years of evidence-based publishing
www.dental-update.co.uk

Final take home messages

- Nothing lasts forever
- Prevention should always therefore be considered
- There is a demonstrable incidence of pulp death following crown preparation
- Dentine bonding facilitates minimal intervention
- A small cavity design works for posterior composites
- Resin composite may provide successful treatment of tooth wear
- Consider repair rather than replacement of defective restorations

Thank you for listening

f.j.t.burke@bham.ac.uk



Look for: Does size matter lecture notes