
A pragmatic approach to
treatment of tooth wear

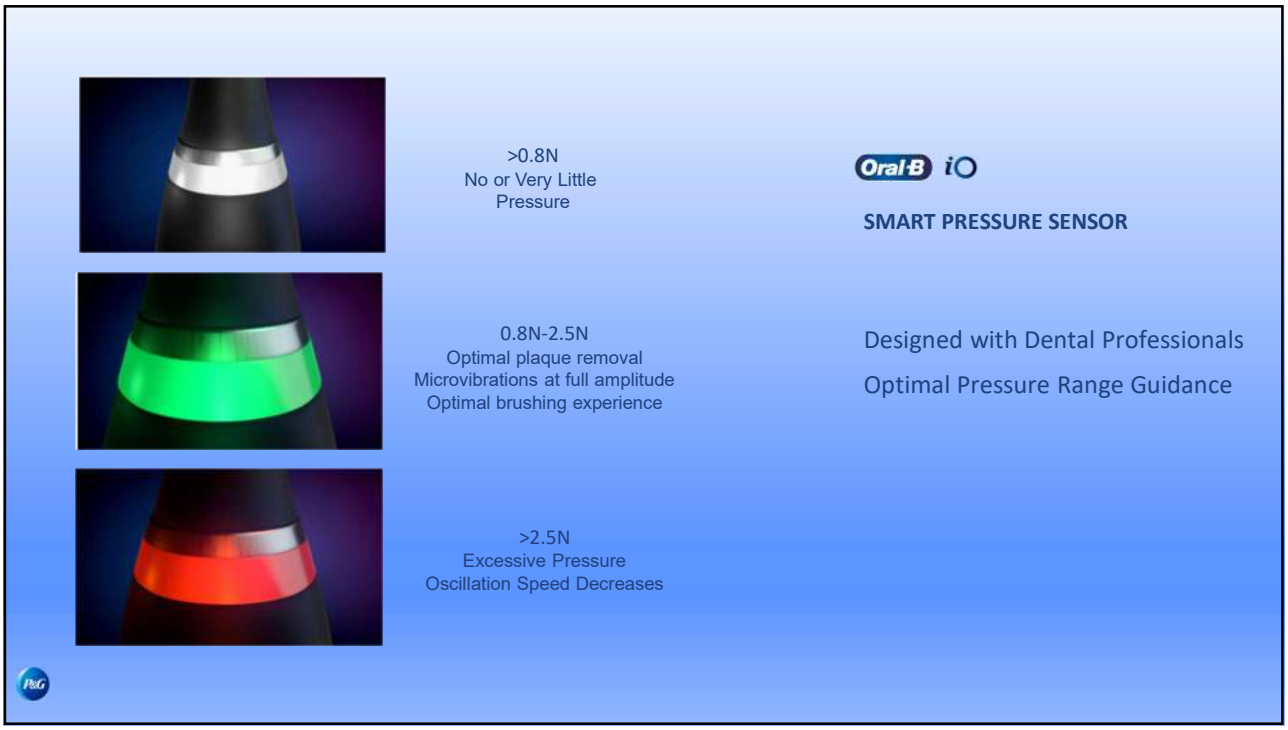
1


INTRODUCING
Oral-B iO
A NEW OSCILLATING ROTATING TOOTHBRUSH PLATFORM
COMPLETE INTERIOR AND EXTERIOR REDESIGN
NOVEL BRUSHING EXPERIENCE

2


Oral-B iO
Key features
iO Linear Magnetic Drive
Oscillation Rotation + Microvibrations
Smart Pressure Sensor
Redesigned Brush Heads

3


>0.8N
No or Very Little
Pressure
0.8N-2.5N
Optimal plaque removal
Microvibrations at full amplitude
Optimal brushing experience
>2.5N
Excessive Pressure
Oscillation Speed Decreases
Oral-B iO
SMART PRESSURE SENSOR
Designed with Dental Professionals
Optimal Pressure Range Guidance

4

5

Disclosures

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

"Some manufacturers fund my research"

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

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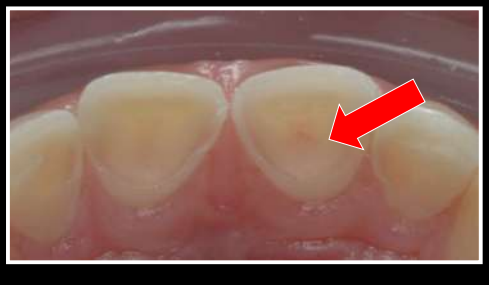
How do we get from here..

20 year-old patient
High volume of sports energy drinks



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..to here

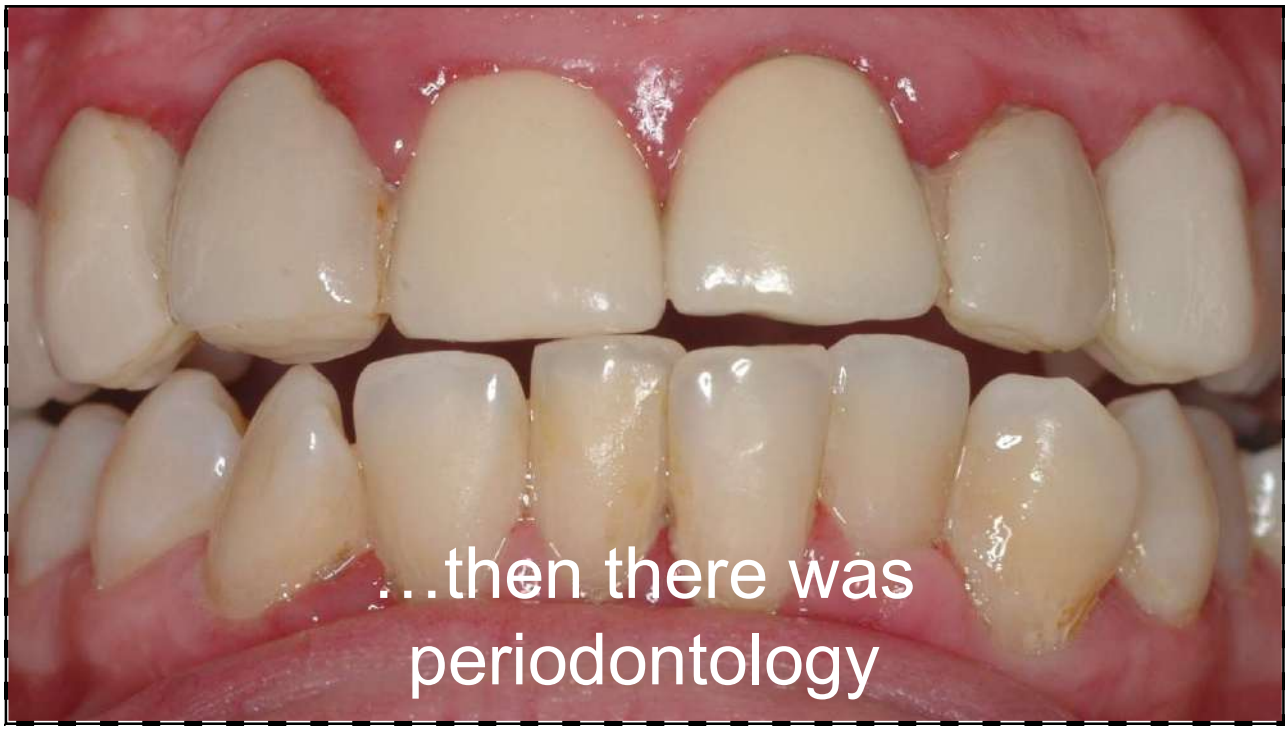
3 years

9

In the beginning

10

11



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Lecture content:

- Effect of cutting tooth substance
- Incidence of tooth wear
- Bonding composite to worn teeth
- Which composite?
- Principles of dental aesthetics
- The Dahl approach & success rates of treatment
- Patient Information/Patient satisfaction

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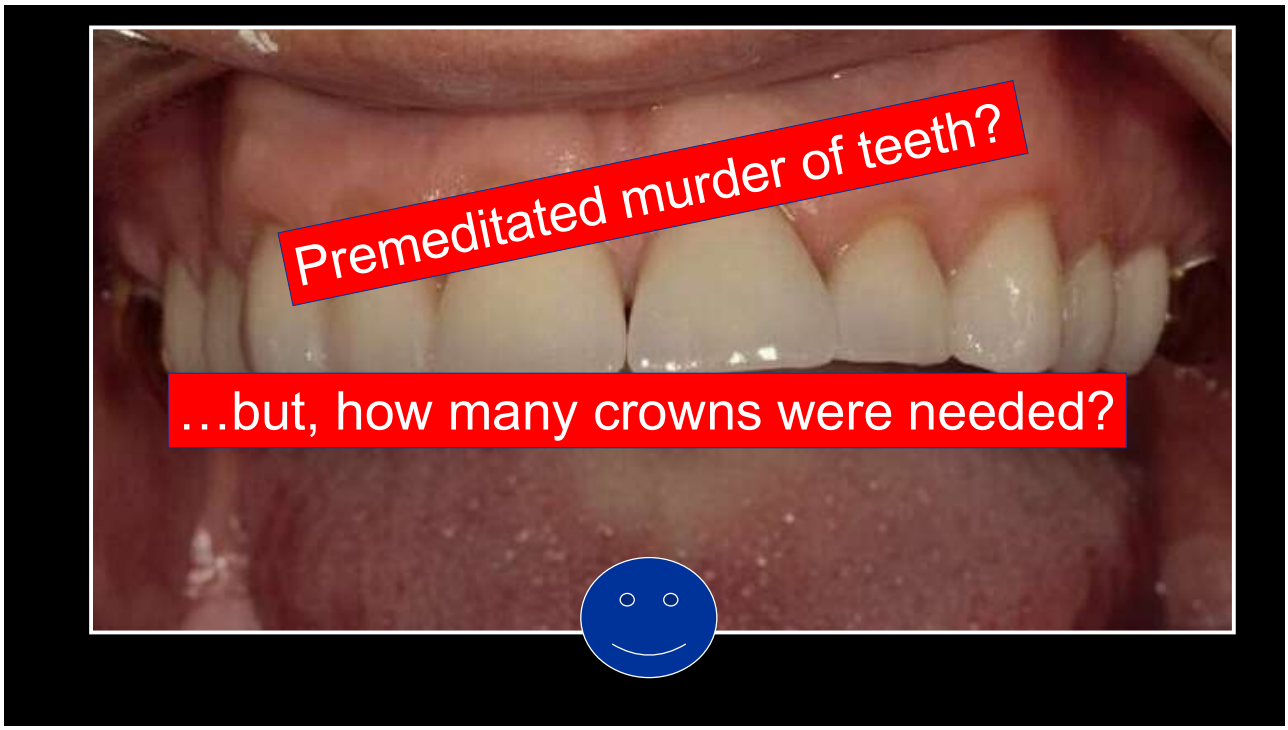
Treatment of tooth wear in the dark ages!

Increasing the OVD - generalised increase by crowning all teeth

15

"Motorway mouth"

16


Premeditated murder of teeth?
…but, how many crowns were needed?

17


Treatment of tooth wear
1996

18

19

20

1996

Treatment of tooth wear using extreme tooth wear by a turbine drill!

21

Why that wasn't a good idea!

Effect of cutting tooth substance

22

briefly…Does drilling affect teeth?

Some work on crowns

23

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

24

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

25

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

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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

27

Long term effects of crown preparation on pulp vitality
Felton D. et al. J.Dent.Res. Abstract 1139

High incidence of pulpal necrosis with full coverage restorations (13.3%)

Placement of foundations resulted in a significant increase in pulp morbidity (18% *vs* 8%)

Correlation between length of temporisation and pulp necrosis

28

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%

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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

30

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

31

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

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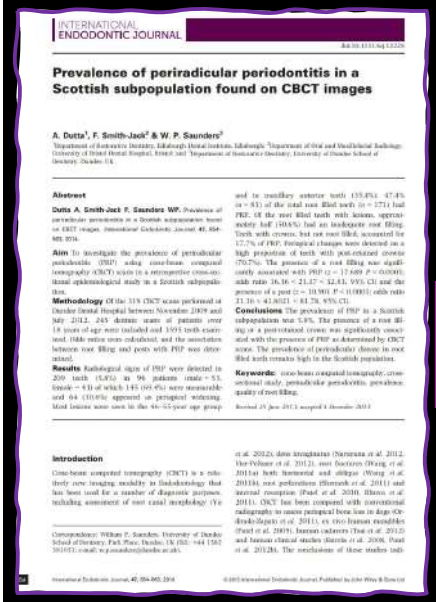
Updated in 2014 using cone beam



INTERNATIONAL ENDODONTIC JOURNAL

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

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

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

33

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

34

Trevor's view:

Drilling isn't great!
……for teeth

35

…therefore

A basic principle:
Minimally invasive methods of treatment should be employed where possible

First mention: Mount GJ. Minimal treatment of the carious lesion. Int.Dent.J.1991:41:55-59

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Incidence of tooth wear

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Epidemiology of tooth wear (1996)

Smith BGN, Robb ND. J.Oral Rehabil.1996:23:232-239

- 1007 patients examined, only 9 had no tooth wear
- Extensive tooth wear in 10%
- Males had more wear than females
- 5.1% of the surfaces examined were extensively worn
- 9% of the surfaces in the oldest age group were extensively worn

- Incisal edge and cervical wear increases with age
- 5.8% of those aged 26 years had unacceptably worn surfaces

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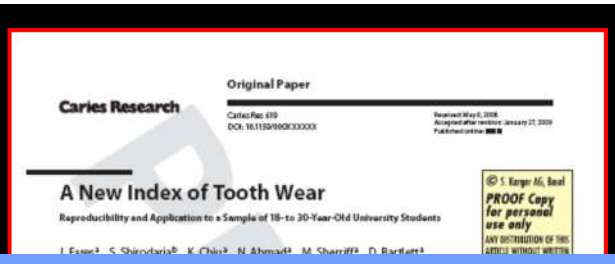
Caries Research

Original Paper

A New Index of Tooth Wear

Reproducibility and Application to a Sample of 18- to 30-Year-Old University Students

- 1010 students aged 18 to 30 years in London
- Examined for tooth wear
- Enamel wear common to all subjects
- 6.1% had more than one third of the tooth surface affected
- Dentine exposed on 5.3% of all surfaces
- 76.9% had one or more surfaces with dentine exposed
- Males significantly more wear than females

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Adult Dental Health Survey (England & Wales) 2009

White DA, Pitts N, Steele J, Cooke P et al, 2011
NHS Information Centre

- Moderate tooth wear increased from 11% in 1998 to 15% in 2009
- Severe tooth wear remains rare, but increased since the last survey
- Increasing proportion of young adults with moderate wear

40

Adult Dental Health Survey (England & Wales) 2009

White DA, Pitts N, Steele J, Cooke P et al, 2011, NHS Information Centre

- 77% of dentate adults showed some tooth wear in their anterior teeth
- 15% showed moderate wear, 2% severe wear
- Men have higher incidence of tooth wear
- More tooth wear in N Ireland and Wales than England (88%, 87% vs 77%)
- No clear relationship with smoking

41

Adult Dental Health Survey 2009: Damage is cumulative

White DA, Pitts N, Steele J, Cooke P et al, 2011, NHS Information Centre

- 52% of adults of 18y to 24y showed some tooth wear compared with 95% of 75 to 84 year olds
- 4% of adults of 18y to 24y showed moderate tooth wear compared with 44% of 75 to 84 year olds
- 0.5% of adults of 18y to 24y showed severe tooth wear compared with 6% of 75 to 84 year olds

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Tooth wear in Europe (2013)

JOURNAL OF DENTISTRY 41 (2013) 1007–1013

Available online at www.sciencedirect.com

ScienceDirect

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

Prevalence of tooth wear on buccal and lingual surfaces and possible risk factors in young European adults

D.W. Bartlett [a,*], A. Lussi [b], N.X. West [c], P. Bouchard [d], M. Sanz [e], D. Bourgeois [f,g]

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[b] Department of Preventive, Restorative and Pediatric Dentistry, University of Bern, CH-3010 Bern, Switzerland
[c] Periodontology, Bristol Dental School, Bristol, UK
[d] Department of Periodontology, Service of Odontology, Rothschild Hospital, AP-HP, Paris 7-Denis Diderot University, U.F.R. of Odontology, EA 2496 Paris, France
[e] Department of Periodontology Periodontics, Facultad de Odontologia, University Complutense of Madrid, Spain
[f] Department of Public Health, EA 4129, University Lyon 1, France
[g] International and European Affairs, University Lyon, France

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- 3187 young adults, 7 countries in Europe
- Estonia, Finland, France, Italy, Latvia, Spain, UK
- Tooth wear measured using BEWE index

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- Highest levels of TW found in UK
- UK had higher levels of TW on back teeth, while in other countries TW affected anterior teeth more than back teeth
- Strong association of TW in patients taking sleeping medication and antidepressants
- TW associated with acidic drinks, especially fresh fruit & energy drinks
- TW also associated with repeated
- vomiting & residence in rural areas

Also, higher incidence of TW in persons who classified themselves as managers!!

45

CONCLUSIONS

- Facial and oral tooth wear in adults aged 18 to 34 years was common and affected more than 25% of this population.

- Regular consumption of fruit and repeated vomiting were associated with high levels of tooth wear.

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Prevalence of tooth wear in adults

Spijker AV, Rodriguez JM, Kreulen CM, Bronkhorst EM, Bartlett DW, Creugers NHJ. Int.J.Prosthodont.2009:22:35-42

- 186 references examined, 12 (from10 different countries) survived the inclusion procedure and 4 used for regression analysis
- Males had more TW than females
- % of adults with severe TW increases from 3% at 20 years to 17% at 70 years
- The Smith/Knight Index was found to be a relatively crude index

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Tooth Wear Themed Issue | GENERAL

Erosive tooth wear – a review on global prevalence and on its prevalence in risk groups

N. Schlueter*† and B. Luka†

Key points

Introduction

Erosion prevalence in the general population

Global prevalence of erosive tooth wear

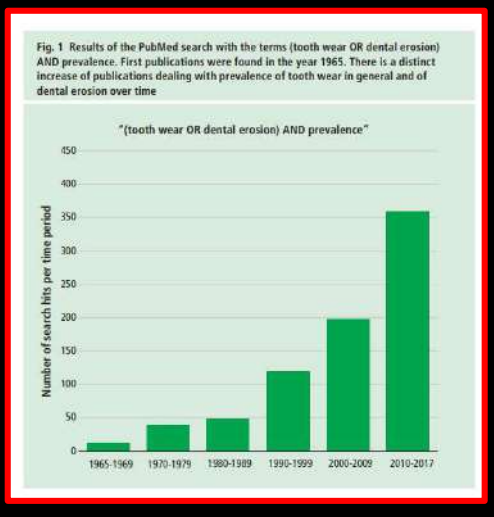

Fig. 1 Results of the PubMed search with the terms (tooth wear OR dental erosion) AND prevalence. First publications were found in the year 1965. There is a distinct increase of publications dealing with prevalence of tooth wear in general and of dental erosion over time

Br.Dent.J.2018:224:364-370.

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Global prevalence of erosive tooth wear

158 articles searched

Variation worldwide

…between 20% and 45% in permanent teeth

UK prevalence of erosive tooth wear

UK data, adults

…between 3% and 100% in permanent teeth

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Take home message

Is the incidence of tooth wear rising?

Yes, in many parts of the world, there is a **rise** and **rise** and **rise** of toothwear

It involves a significant % of the population, old and young, males more than females.

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Bonding composite to worn teeth

First, enamel….

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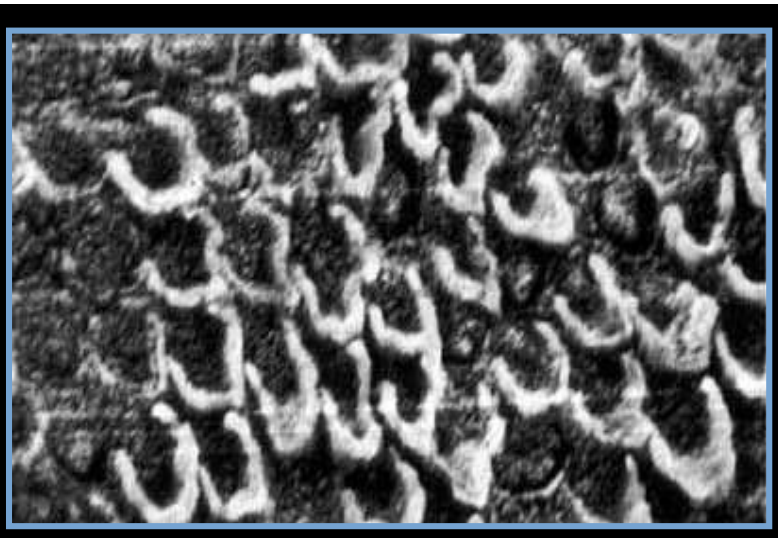

Michael Buonocore

Buonocore MG. A simple method of increasing the adhesion of acrylic filling materials to enamel surfaces. J.Dent.Res.1955:34(6):849-853.

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Composites can be pretty!

and, bonding to enamel is easy

53

COMPOSITION OF DENTINE

70% Inorganic

20% Organic

Bonding to dentine is therefore more difficult

It is a vital substrate

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Bonding composite to worn teeth

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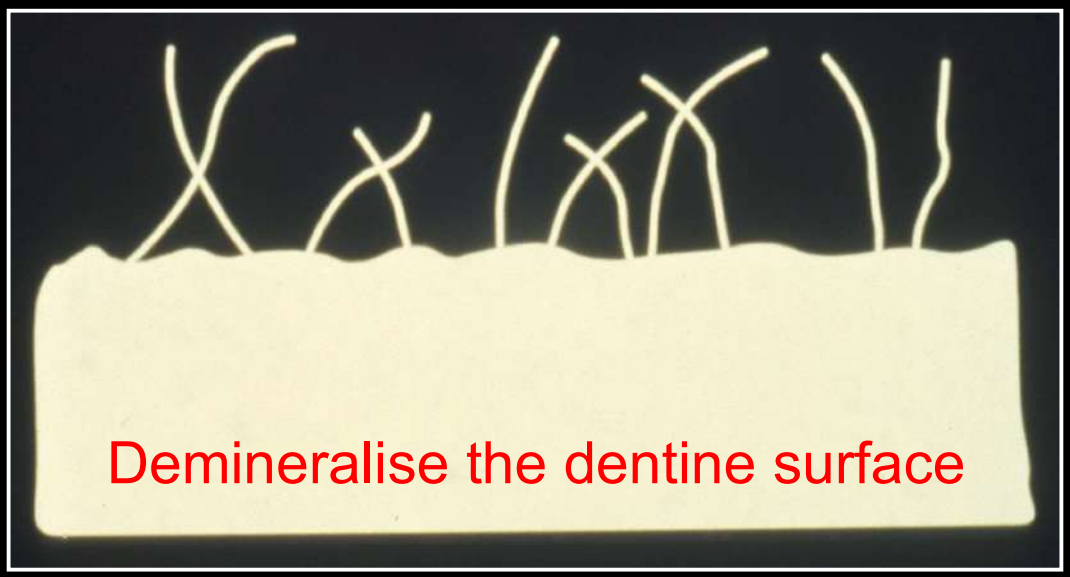

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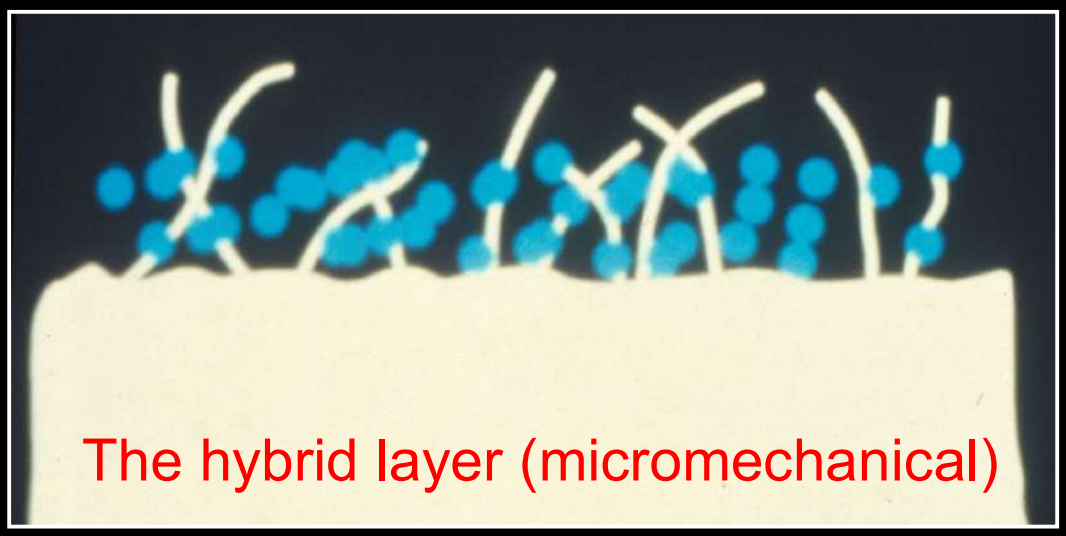

Nakabayashi N, Kojilma K, Masuhara E. The promotion of adhesion by the infiltration of monomers into tooth substrates. J Biomed Mater Res 1982; 16: 265–273.

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The classification, ***until recently***, of dentine bonding systems

1.Etch and rinse
(etch & bond, total etch)
2.Self etch → **One bottle**
→ **Two bottles**

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…a landmark paper

59

Clearfil SE used as bonding agent, pH 2.3

100 class V restorations followed for 5 years

Five-year Clinical Effectiveness of a Two-step Self-etching Adhesive

Marleen Peumans[a]/Jan De Munck[b]/Kirsten Van Landuyt[c]/Paul Lambrechts[a]/
Bart Van Meerbeek[a]

Purpose: The purpose of this prospective randomized controlled clinical study was to evaluate the clinical performance of a "mild" two-step self-etching adhesive, Clearfil SE, in Class V restorations after 5 years of clinical functioning.

Materials and Methods: Twenty-nine patients received two or four restorations following two randomly assigned experimental protocols: (1) a mild self-etching adhesive (Clearfil SE, Kuraray) was applied following manufacturer's instructions on both enamel and dentin (C-SE non-etch); (2) similar application of Clearfil SE, but including prior selective acid-etching of the enamel cavity margins with 40% phosphoric acid (C-SE etch). Clearfil AP-X (Kuraray) was used as the restorative composite for all 100 restorations. The clinical effectiveness was recorded in terms of retention, marginal integrity, marginal discoloration, caries recurrence, postoperative sensitivity, and preservation of tooth vitality after 5 years of clinical service. The hypothesis tested was that selective acid etching of enamel with phosphoric acid improved retention, marginal integrity, and clinical microleakage of Class V restorations.

Results: Only one restoration of the C-SE non-etch group was lost at the 5-year recall. All other restorations were clinically acceptable. Marginal integrity deteriorated with time in both groups. The number of restorations with defect-free margins was significantly lower in the C-SE non-etch group ($p = 0.0043$). This latter group presented significantly more small incisal marginal defects on the enamel side ($p = 0.0169$). Superficial marginal discoloration increased in both groups, but was more pronounced in the C-SE non-etch group and was related to the higher frequency of small incisal marginal defects.

Conclusion: The clinical effectiveness of the two-step self-etching adhesive Clearfil SE remained excellent after 5 years of clinical service. Additional etching of the enamel cavity margins resulted in an improved marginal adaptation on the enamel side; however, this was not critical for the overall clinical performance of the restorations.

Keywords: adhesives, clinical trial, cervical lesions, composite restoration.

J Adhes Dent 2007; 9: 7-10. *Submitted for publication: 10.07.06; accepted for publication: 16.11.06.*

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CONCLUSION

From the results of this study, we may conclude that intra-orally, Clearfil SE performs reliably and stably after 5 years of clinical functioning. Selective enamel etching with phosphoric acid resulted in an improved marginal adaptation, but has no influence on the overall clinical performance of the Class V restorations.

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… the new approach is therefore…. selective enamel etching

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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

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Universal bonding agents:

new additions are on the way!

Most contain the resin 10-MDP

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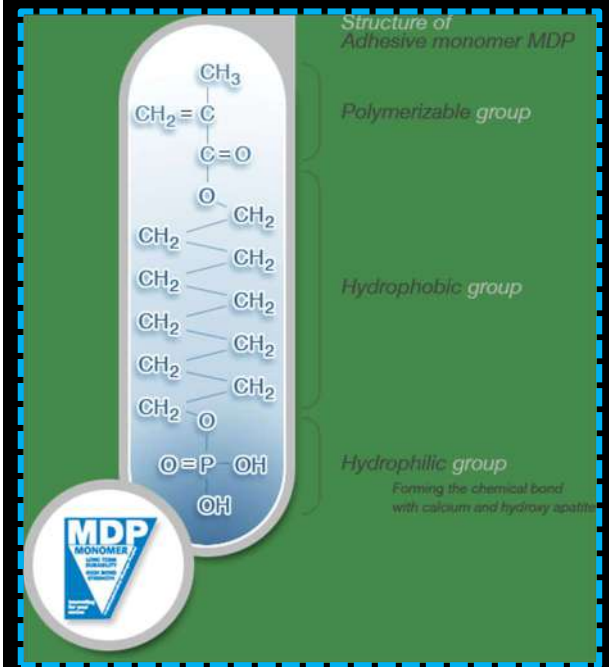

10-MDP seems to be the resin molecule of choice for bonding

10-MDP is important for the status of the bond reaction with HAP

66

SUMMARY: Universal bonding agents:

- Can be used in total etch, self etch, selective enamel etch modes
- Some are compatible with direct & indirect procedures
- Some 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)

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Use these with selective enamel etching

My hunch is that this applies to all Universal bonding agents

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…a tip for optimising bonding..

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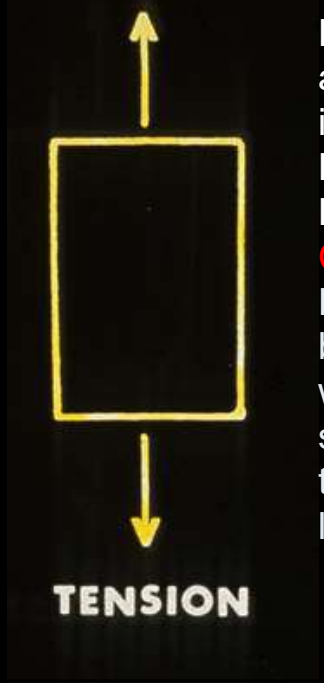


Effects of moisture degree and rubbing action on the immediate resin-dentin bond strength
Dal-Bianco K, Pellizzaro A, et al.
Dent.Mater.2006

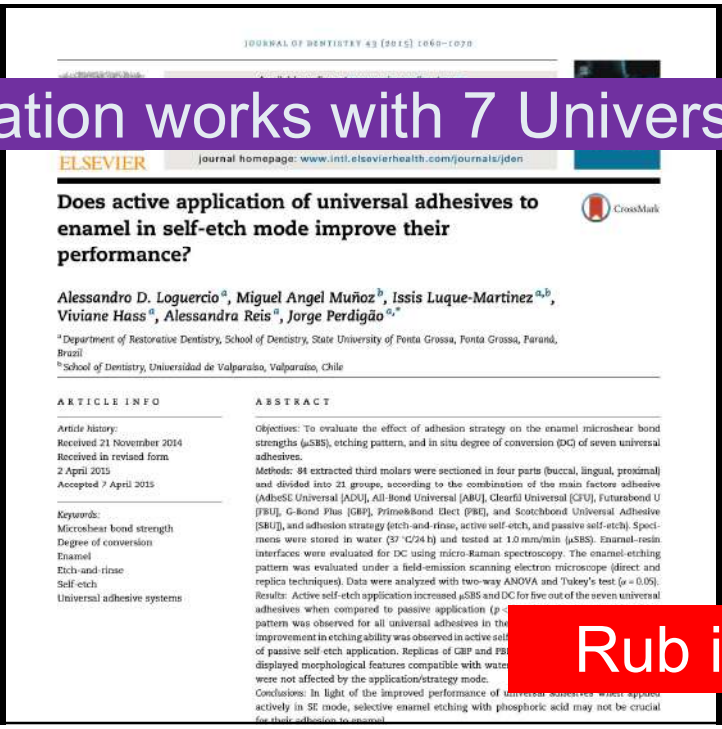
Conclusion:

High bond strength to dentine can be obtained under dry conditions when ethanol/H_2O and acetone based systems are vigorously rubbed on the dentine surface. On wet surfaces, light rubbing may suffice.

Rub it in!

70

Agitation works with 7 Universals!



JOURNAL OF DENTISTRY 43 (2015) 1060–1070

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

Does active application of universal adhesives to enamel in self-etch mode improve their performance?

Alessandro D. Loguercio [a], Miguel Angel Muñoz [b], Issis Luque-Martinez [a,b], Viviane Hass [a], Alessandra Reis [a], Jorge Perdigão [a,*]

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[b] School of Dentistry, Universidad de Valparaíso, Valparaíso, Chile

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Enamel
Etch-and-rinse
Self-etch
Universal adhesive systems

ABSTRACT

Objectives: To evaluate the effect of adhesion strategy on the enamel microshear bond strengths (μSBS), etching pattern, and in situ degree of conversion (DC) of seven universal adhesives.

Methods: 84 extracted third molars were sectioned in four parts (buccal, lingual, proximal) and divided into 21 groups, according to the combination of the main factors adhesive (AdheSE Universal [ADU], All-Bond Universal [ABU], Clearfil Universal [CFU], Futurabond U [FBU], G-Bond Plus [GBP], Prime&Bond Elect [PBE], and Scotchbond Universal Adhesive [SBU]), and adhesion strategy (etch-and-rinse, active self-etch, and passive self-etch). Specimens were stored in water (37 °C/24 h) and tested at 1.0 mm/min (μSBS). Enamel–resin interfaces were evaluated for DC using micro-Raman spectroscopy. The enamel-etching pattern was evaluated under a field-emission scanning electron microscope (direct and replica techniques). Data were analyzed with two-way ANOVA and Tukey's test ($\alpha = 0.05$).

Results: Active self-etch application increased μSBS and DC for five out of the seven universal adhesives when compared to passive application ($p <$ pattern was observed for all universal adhesives in the improvement in etching ability was observed in active self of passive self-etch application. Replicas of GBP and PB displayed morphological features compatible with wate were not affected by the application/strategy mode.

Conclusions: In light of the improved performance of actively in SE mode, selective enamel etching with phosphoric acid may not be crucial for their adhesion to enamel.

Rub it in!

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Avoiding post-op sensitivity when using dentine bonding agents

Do not overdry the dentine
Use a so-called Self Etch or Universal Material and rub it in
Do ***not*** etch the dentine when using these materials-selective enamel etching
Effective light curing

72

Checking your light curing unit, or not?

Every 3 months is probably enough
(Palin W. personal communication)

53.1% of respondents stated that they checked their LCU

Bure FJT, Wilson NHF, Brunton PA. Contemporary dental practice in the UK. Part 1: demography and practising arrangements in 2015. Br.Dent.J.2019: 226: 55-61.

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Recently!

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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”

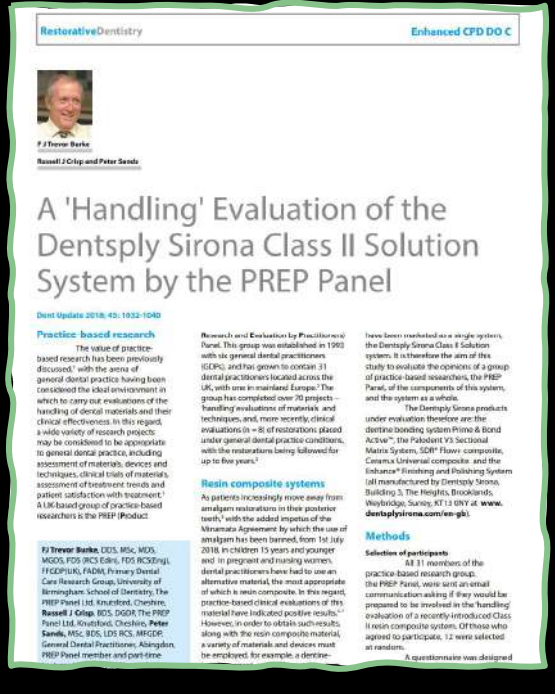
“Packaging of single dose compules a little bulky”

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

75



RestorativeDentistry Enhanced CPD DO C

FJ 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 (Product

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

Research and Evaluation by Practitioners) Panel. This group was established in 1990 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]

Resin composite systems

As patients increasingly move away from amalgam restorations in their posterior teeth,[4] 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.[5,6] 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 or 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

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

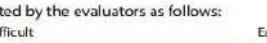
Difficult Easy to use

1  5

4.8

The ease of use of ceram.X was rated by the evaluators as follows:

Difficult Easy

1  5

4.8

The viscosity of ceram.X was stated to be satisfactory by all 100% of the evaluators.

The evaluators rated the working time of ceram.X as follows:

Too short Too long

1  5

3.0

The ease of finishing and polishing of ceram.X was rated as follows:

Difficult Easy

1  5

4.4

76

The PREP Panel evaluation of G Premio Bond

G-Premio Bond family

Handling evaluation

77

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 — 4.6 — 5 Easy to use

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 — 4.9 — 5 Easy to use

78

SUMMARY

Universal bonding agents score highly for ease of use

79

The latest!

80

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

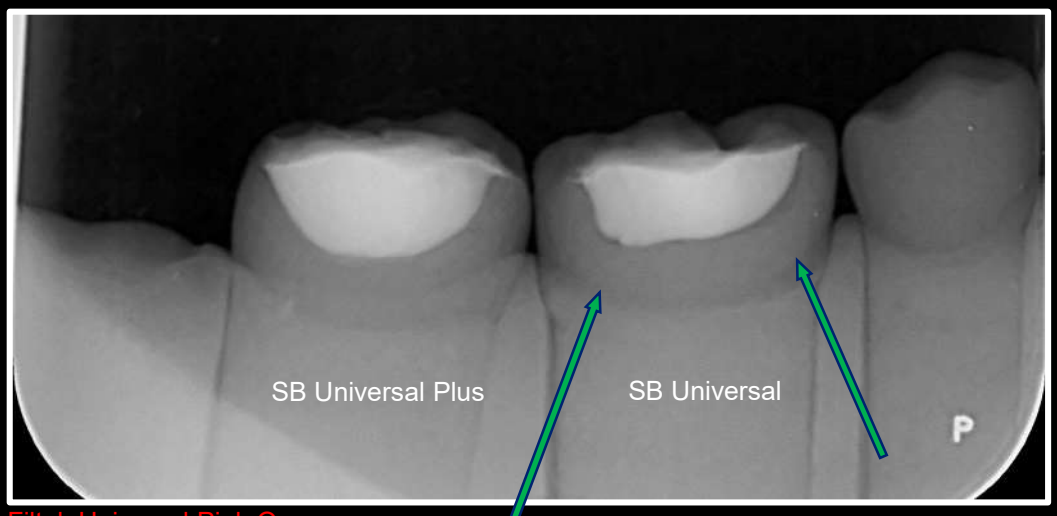
BPA free

The gamechanger

81

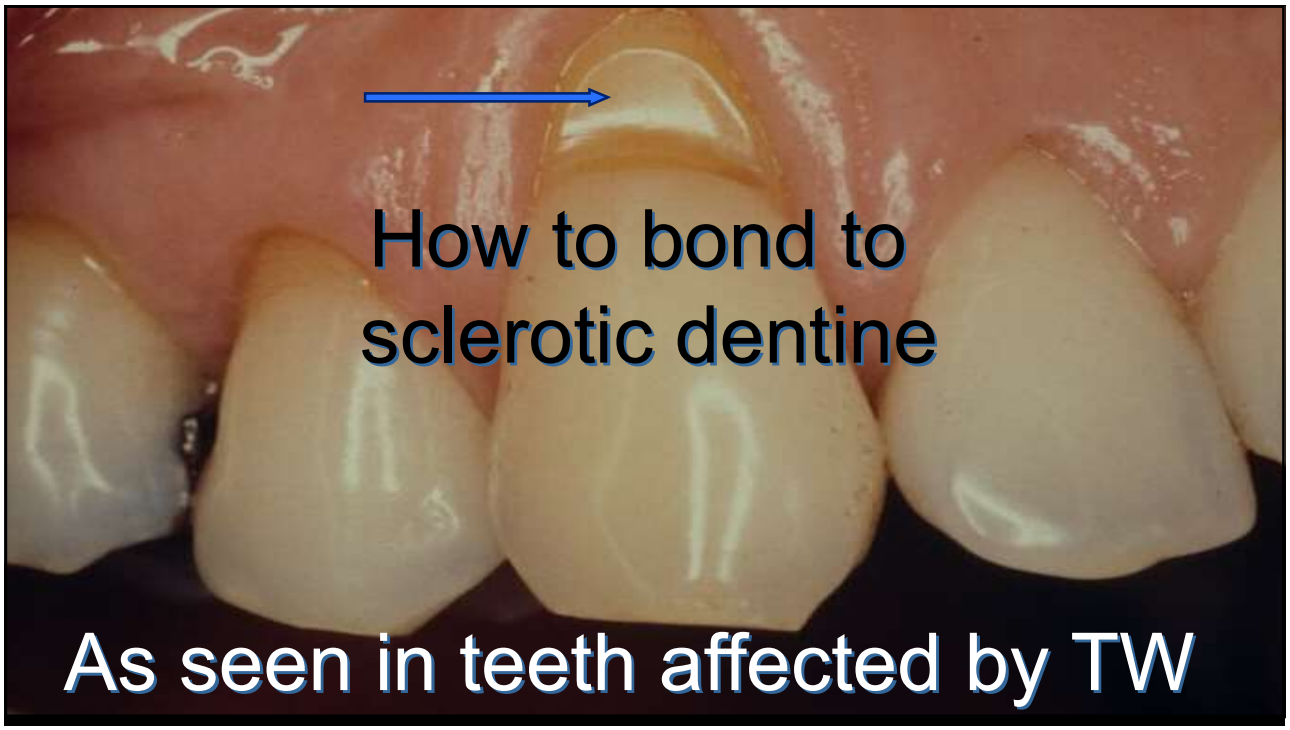
A longstanding question

Is it a layer of bond? Or is it caries?



Filtek Universal Pink Opaque

82



83

Maximising class V effectiveness

The survival of Class V restorations in general dental practice: part 3, five-year survival

D. Stewardson,[1] S. Creanor,[2] P. Thornley,[3] T. Bigg,[4] C. Bromage,[5] A. Browne,[6] D. Cottam,[7] D. Dalby,[8] J. Gilmour,[9] J. Horton,[10] E. Roberts,[11] L. Westoby[12] and T. Burke[13]

RESEARCH

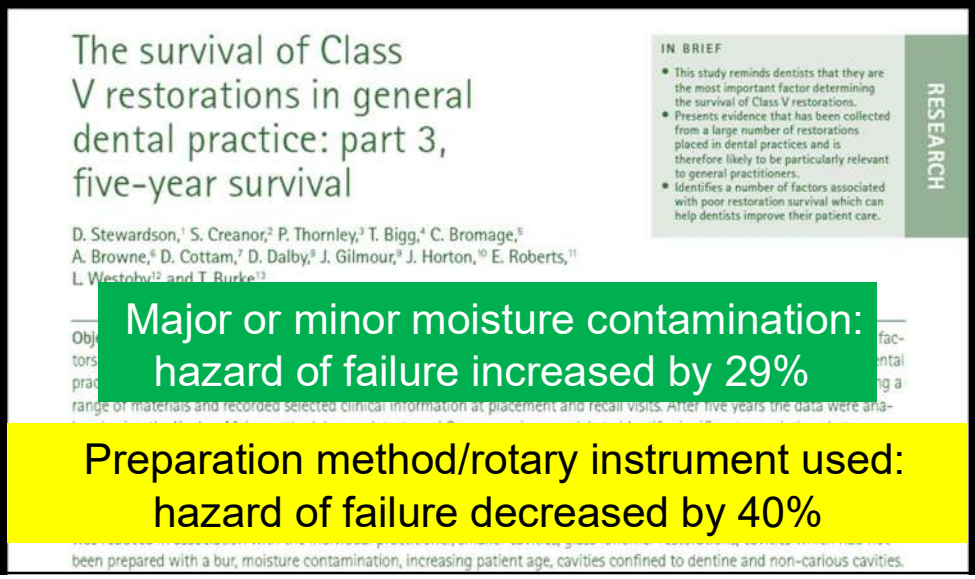
IN BRIEF

- This study reminds dentists that they are the most important factor determining the survival of Class V restorations.
- Presents evidence that has been collected from a large number of restorations placed in dental practices and is therefore likely to be particularly relevant to general practitioners.
- Identifies a number of factors associated with poor restoration survival which can help dentists improve their patient care.

Objective To evaluate the survival over five years of Class V restorations placed by UK general practitioners, and to identify factors associated with increased longevity. **Design** Prospective longitudinal cohort multi-centre study. **Setting** UK general dental practices. **Materials and method** Ten general dental practitioners each placed 100 Class V restorations of varying sizes, using a range of materials and recorded selected clinical information at placement and recall visits. After five years the data were analysed using the Kaplan-Meier method, log-rank tests and Cox regressions models to identify significant associations between the time to restoration failure and different clinical factors. **Results** After five years 275/989 restorations had failed (27.8%), with 116 (11.7%) lost to follow-up. Cox regression analysis identified that, in combination, the practitioner, patient age, cavity size, moisture contamination and cavity preparation were found to influence the survival of the restorations. **Conclusions** At least 60.5% of the restorations survived for five years. The time to failure of Class V restorations placed by this group of dentists was reduced in association with the individual practitioner, smaller cavities, glass ionomer restorations, cavities which had not been prepared with a bur, moisture contamination, increasing patient age, cavities confined to dentine and non-carious cavities.

84

Maximising class V effectiveness: what is associated with failure at 5 years?



The survival of Class V restorations in general dental practice: part 3, five-year survival

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- This study reminds dentists that they are the most important factor determining the survival of Class V restorations.
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RESEARCH

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Major or minor moisture contamination: hazard of failure increased by 29%

Preparation method/rotary instrument used: hazard of failure decreased by 40%

been prepared with a bur, moisture contamination, increasing patient age, cavities confined to dentine and non-carious cavities.

85

Maximising class V effectiveness: what material is best at 5 years?

Five year survival

RMGI 78.6%

Amalgam 75%

Compomer 71.2%

Flowable composite 69%

Composite 68.3%

Glass ionomer 50.6%

86

Class V meta analysis: conclusions

"The dentist shall roughen the dentine and enamel surfaces"

"Additional bevelling of enamel can be omitted"

"Isolation with rubber dam is recommended"


Review

Clinical performance of cervical restorations—
A meta-analysis

87

Gwinnett AJ, Kanca J. Interfacial morphology of resin composite and shiny erosion lesions. Am.J.Dent.1992:5:315-317.

Zimmerli B, De Munck J, Lussi A, Lambrechts P, van Meerbeck B. Long-term bonding to eroded dentin requires superficial bur preparation. Clin.Oral Invest.2012:16:1451-1461.

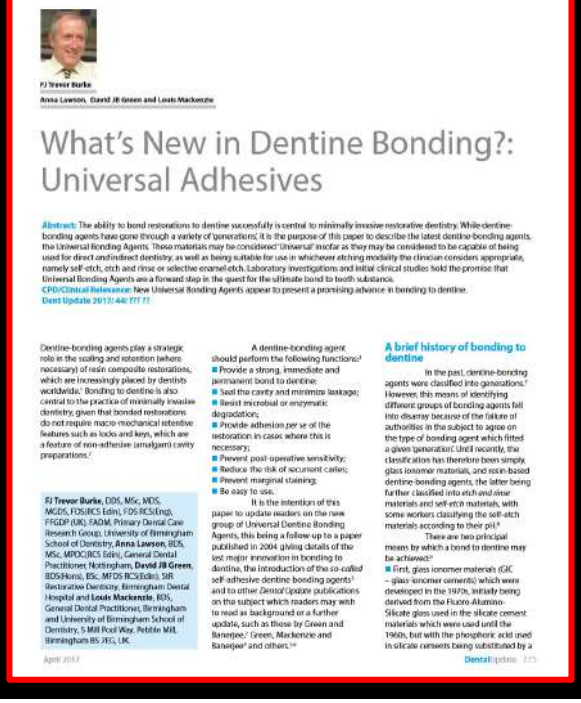
How to bond to sclerotic dentine

88

Trevor's view:

Making shiny, sclerotic surfaces not shiny increases bond strength –use a bur or an intraoral sandblaster

89



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: 777 ??

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), SIR 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[1] 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,[2] Green, Mackenzie and Banerjee[3] and others.[4–6]

A brief history of bonding to dentine

In the past, dentine-bonding agents were classified into generations.[1] 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.[4]

There are two principal means by which a bond to dentine may be achieved:[5]
- 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

90

RCT:
34 patients,
152 NCCLs

*Operative Dentistry, 2019, 44-5, 476-487

Bonding Performance of Simplified Adhesive Systems in Noncarious Cervical Lesions at 2-year Follow-up: A Double-blind Randomized Clinical Trial

RF Zanatta • TM Silva • MALR Esper • E Bresciani • SEP Gonçalves • TMF Caneppelo

Clinical Relevance

The composition and adhesion strategy of current simplified adhesives may be used for noncarious cervical lesions with minimal dentin sclerosis.

SUMMARY

Objectives: This study aimed to evaluate the bonding performance of a universal adhesive used according to self-etching or etch-and-rinse protocols in noncarious cervical lesions (NCCLs) and to compare the two protocols with their respective gold standard techniques.

Methods and Materials: This randomized, double-blind clinical study enrolled 34 participants who met the inclusion criteria, 29 of whom returned after two years. They received 152 restorations bonded with one of the three adhesives (Scotchbond Universal Adhesive, Adper Single Bond 2, or Clearfil SE Bond) and one of the two bonding techniques tested. The NCCLs were restored with nanocomposite resin (Filtek Supreme). Final contours were done with a fine diamond rotary instrument and polished with rubber points. The restorations were evaluated using the FDI World

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DOI: https://doi.org/10.2341/18-040-C

Bonded with SB Universal, Adper Single Bond, Clearfil SE

91

*Operative Dentistry, 2019, 44-5, 476-487

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DOI: https://doi.org/10.2341/18-040-C

The success of universal adhesives is attributed to the presence of 10-MDP monomer, which is responsible for the chemical bonding, creating a stable interface even without micromechanical retention.

CONCLUSION: This 2-year clinical evaluation showed that SB Universal performed similarly in restoring NCCLs compared with the etch&rinse (Single Bond) or self-etch (Clearfil SE) systems

92

18 pages!!

Shear bond strength tests

Bonding Performance of Universal Adhesives: An Updated Systematic Review and Meta-Analysis

Carlos Enrique Cuevas-Suárez[a] / Wellington Luiz de Oliveira da Rosa[b] / Rafael Guerra Lund[c] / Adriana Fernandes da Silva[d] / Evandro Piva[e]

Purpose: To evaluate through a systematic review and meta-analysis whether the immediate and long-term bonding performance of universal adhesives would be improved by prior acid etching.

Materials and Methods: Two reviewers performed a literature search up to April 2018 in eight databases: PubMed, Web of Science, Cochrane Library, SciELO, Scopus, LILACS, IBECS, and BBO. Only studies that evaluated the dentin or enamel bond strength of universal adhesives using a self-etch or etch-and-rinse strategy were included. Analyses were carried out using RevMan 5.3.5 (The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, Denmark). A global analysis comparing self-etch or etch-and-rinse strategies and the influence of aging on bonding performance was performed with random-effects models at a significance level of $p < 0.05$.

Results: A total of 59 in vitro studies were included in the meta-analysis. The enamel bond strength of universal adhesives was improved by the etch-and-rinse approach ($p < 0.05$). In dentin, this effect was observed for ultra-mild and intermediately strong universal adhesives ($p < 0.05$). Irrespective of the strategy employed, intermediately strong adhesives showed a decrease in bond strength after all types of aging. This effect was also observed for ultra-mild universal adhesives used in the etch-and-rinse approach ($p < 0.05$). Mild universal adhesives showed bond strength stability in both strategies ($p > 0.05$).

Conclusions: The in vitro evidence suggests that bonding performance of mild universal adhesives can be improved by using the selective enamel-etch strategy. Mild universal adhesives seem to be the more stable materials, in both etch-and-rinse or self-etch strategies.

Keywords: adhesive, dental bonding, dental materials, universal adhesives, systematic review.

The current adhesives can be classified according to their adhesion strategy into etch-and-rinse or self-etch adhesives.[1,2] Etch-and-rinse adhesives are applied after complete phosphoric acid etching of the dental substrates (dentin and enamel).[3] On the other hand, the acid etching step is eliminated in the self-etching adhesives, as they contain monomers with acidic functional groups that simultaneously etch and prime the dental substrate.[4]

Currently, clinicians may choose between these two types of adhesives.[1,2] According to Van Meerbeek,[1,2] despite the high-product dependency, both types of adhesives have performed successfully in both laboratory and clinical research. The current evidence has pointed out that adequate bonding to dentin can be achieved with the self-etch approach.[5–10,17] However, this strategy has revealed some limitations in bonding to enamel.[11,12] The bond strength to enamel with self-etch adhesives has been reported to be lower than that of etch-and-rinse adhesives.[1,2,12] Thus, selec-

9284 publications, 81 read in full, 57 reviewed

93

Finally, although it is difficult to stablish a relationship between the bonding effectiveness measured in the laboratory with the clinical effectiveness determined by randomized clinical trials,[121] it must be mentioned that the generally superior laboratory data of the adhesives currently considered the "gold standard" confirms their excellent clinical performance.[14,72] Since the main causes of failure of composite restorations are related to the occurrence of fracture and secondary caries, achieving a stable bonding interface, especially in the long-term, renders the restorative treatment more predictable in terms of clinical performance. Considering the results obtained in this review, the following recommendations to clinicians are made: a) when applied to dentin, prior acid etching before the use of intermediately strong and ultra-mild universal adhesives it is not recommendable, and b) selective etching of enamel followed by the application of a mild universal adhesive currently appears to be the best choice to effectively achieve a durable bond to tooth tissues.

94

What is the cost of one failed adhesive restoration?

95

Take home message:Avoiding adhesive failures

Dentine bonding is now reliable and effective, so:
Use a material from a manufacturer with experience in the field and follow the instructions!!
One bottle bonding (reduced risk of error) – new Universal materials are a significant advance
Effective light curing (check your light regularly!)
Think seriously about selective enamel etching

96

Trevor's view:

Use your favourite anterior composite, but the technique success depends on the bonding agent, so use one that has research to back it up!

97

For my tooth wear patients, I switched to Scotchbond Universal when it was introduced in September 2011

Fewer adhesive failures than previously!

98

Briefly, some principles of dental aesthetics in relation to length/width ratios and tooth to tooth ratios

99

The Golden Proportion

0.618 **1.0** **1.618**

canine **lateral** **central**

Levin EL. Dental esthetics and the golden proportion. J.Prosthet.Dent.1978:40:244-252.

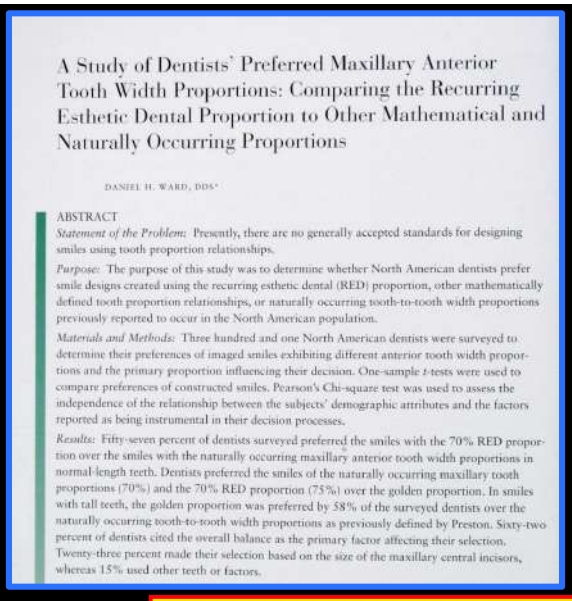
100

The Preston Proportion:

Results, following a survey of the North American population, indicated that the width of the average maxillary lateral incisor was 66% of the width of the average central incisor, & the average canine was 84% of the width of the average lateral incisor

Preston JD. The golden proportion revisited. J.Esthet.Dent.1993:5:247-251

101



A Study of Dentists' Preferred Maxillary Anterior Tooth Width Proportions: Comparing the Recurring Esthetic Dental Proportion to Other Mathematical and Naturally Occurring Proportions

DANIEL H. WARD, DDS*

ABSTRACT

Statement of the Problem: Presently, there are no generally accepted standards for designing smiles using tooth proportion relationships.

Purpose: The purpose of this study was to determine whether North American dentists prefer smile designs created using the recurring esthetic dental (RED) proportion, other mathematically defined tooth proportion relationships, or naturally occurring tooth-to-tooth width proportions previously reported to occur in the North American population.

Materials and Methods: Three hundred and one North American dentists were surveyed to determine their preferences of imaged smiles exhibiting different anterior tooth width proportions and the primary proportion influencing their decision. One-sample *t*-tests were used to compare preferences of constructed smiles. Pearson's Chi-square test was used to assess the independence of the relationship between the subjects' demographic attributes and the factors reported as being instrumental in their decision processes.

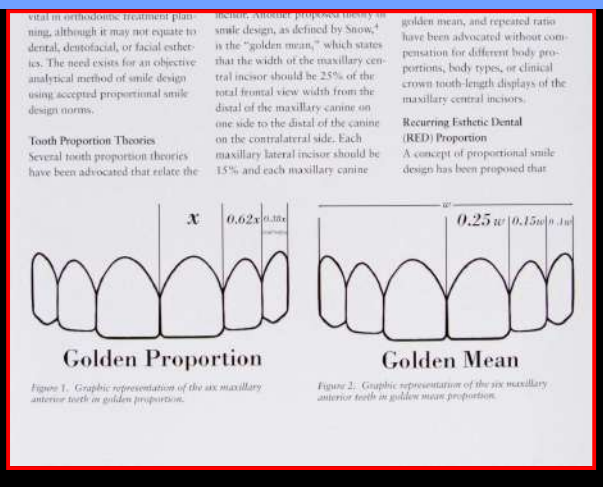
Results: Fifty-seven percent of dentists surveyed preferred the smiles with the 70% RED proportion over the smiles with the naturally occurring maxillary anterior tooth width proportions in normal-length teeth. Dentists preferred the smiles of the naturally occurring maxillary tooth proportions (70%) and the 70% RED proportion (75%) over the golden proportion. In smiles with tall teeth, the golden proportion was preferred by 58% of the surveyed dentists over the naturally occurring tooth-to-tooth width proportions as previously defined by Preston. Sixty-two percent of dentists cited the overall balance as the primary factor affecting their selection. Twenty-three percent made their selection based on the size of the maxillary central incisors, whereas 15% used other teeth or factors.

Survey of 301 North American dentists to determine preferences of anterior tooth width proportions

Ward DH. J.Esthet.Dent.2007:19:324-339

102

Golden Mean: Width of maxillary central should be 25% of the total frontal width, each lateral should be 15% and each canine 10%.



vital in orthodontic treatment planning, although it may not equate to dental, dentofacial, or facial esthetics. The need exists for an objective analytical method of smile design using accepted proportional smile design norms.

Tooth Proportion Theories

Several tooth proportion theories have been advocated that relate the

smile design, as defined by Snow,[4] is the "golden mean," which states that the width of the maxillary central incisor should be 25% of the total frontal view width from the distal of the maxillary canine on one side to the distal of the canine on the contralateral side. Each maxillary lateral incisor should be 15% and each maxillary canine

golden mean, and repeated ratio have been advocated without compensation for different body proportions, body types, or clinical crown tooth-length displays of the maxillary central incisors.

Recurring Esthetic Dental (RED) Proportion

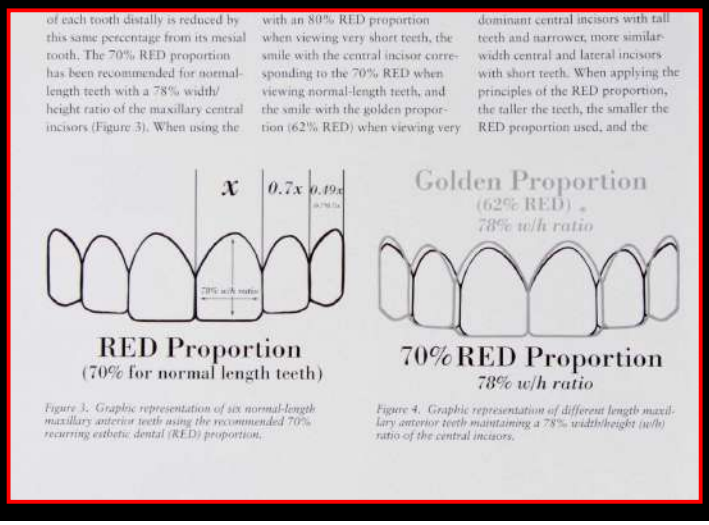
A concept of proportional smile design has been proposed that

Figure 1. Graphic representation of the six maxillary anterior teeth in golden proportion.

Figure 2. Graphic representation of the six maxillary anterior teeth in golden mean proportion.

103

RED (Recurrent Esthetic Dental): The proportion of the successive widths of the maxillary teeth as viewed from the front should remain constant, progressing distally



of each tooth distally is reduced by this same percentage from its mesial tooth. The 70% RED proportion has been recommended for normal-length teeth with a 78% width/height ratio of the maxillary central incisors (Figure 3). When using the

with an 80% RED proportion when viewing very short teeth, the smile with the central incisor corresponding to the 70% RED when viewing normal-length teeth, and the smile with the golden proportion (62% RED) when viewing very

dominant central incisors with tall teeth and narrower, more similar-width central and lateral incisors with short teeth. When applying the principles of the RED proportion, the taller the teeth, the smaller the RED proportion used, and the

Figure 3. Graphic representation of six normal-length maxillary anterior teeth using the recommended 70% recurring esthetic dental (RED) proportion.

Figure 4. Graphic representation of different length maxillary anterior teeth maintaining a 78% width/height (w/h) ratio of the central incisors.

104

Results

57% of dentists preferred the smiles with the 70% RED proportion

Dentists preferred the smiles of the naturally occurring maxillary tooth proportions (70%) and the RED proportion (75%) over the golden proportion

In smiles with tall teeth, the golden proportion was preferred by 58% of dentists

105

Conclusion

Smiles created using the principles of the RED proportion were preferred by a majority of dentists surveyed

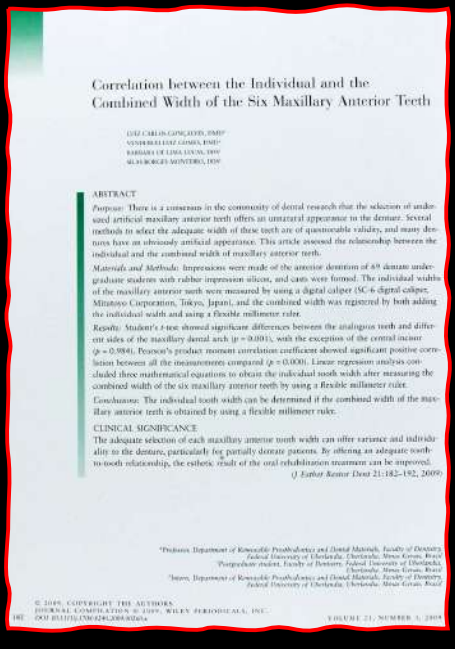
106

Trevor's conclusion

There is no real consensus among dentists
with regard to smile design!

107

Most recently…..



Correlation between the Individual and the Combined Width of the Six Maxillary Anterior Teeth

ABSTRACT

CLINICAL SIGNIFICANCE

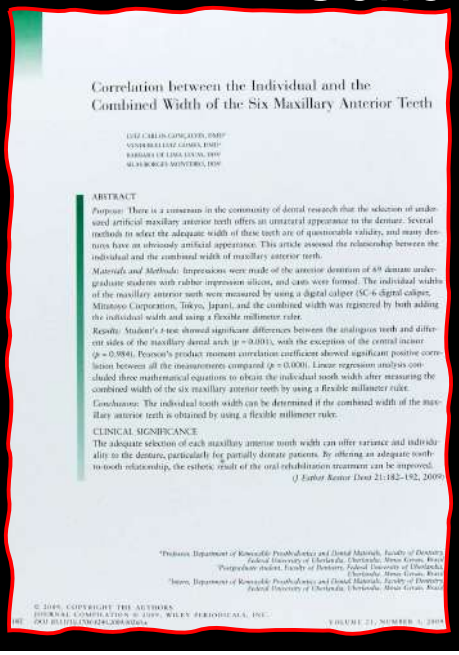
- Impressions made of 69 dentate students in Brazil
- Anterior teeth measured with digital calipers

108

"Significant difference between analogous teeth from both sides of the arch, except for the central incisors"

109

Conclusions



Correlation between the Individual and the Combined Width of the Six Maxillary Anterior Teeth

ABSTRACT

CLINICAL SIGNIFICANCE

- Nature is rarely perfectly predictable
- There is usually substantial variation around the fitted regression line
- When restoring teeth, symmetry of the central incisors is ***central*** to success

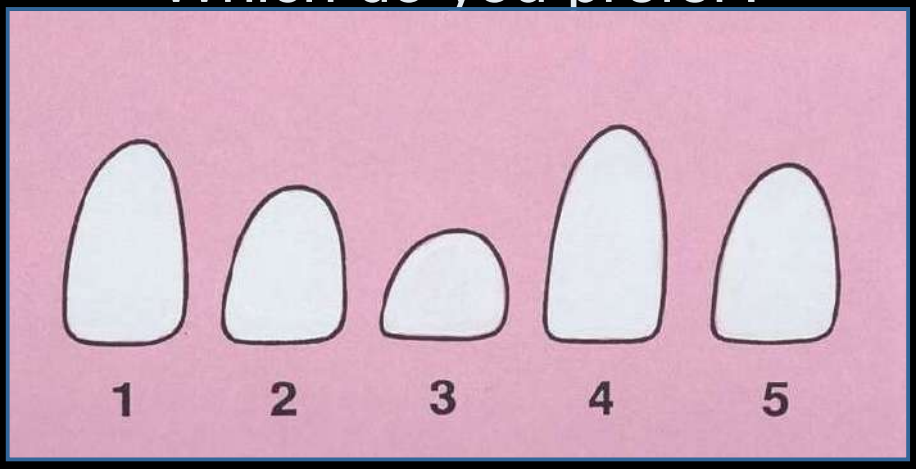
110

Length to width ratios

This is important when we are treating tooth wear because we may plan to change the shape of teeth

111

Width/Length Ratio? Which do you prefer?



0.62 0.80 1.0 0.56 0.70

112

Sterrett JD et al. Width/length ratios of normal clinical crowns of the maxillary anterior dentition in man. J.Clin.Periodontol.1999:26:153-157

Subjects > 20yrs recruited
Alginate impressions taken
Calipers used to measure teeth
Gender, ethnicity and height recorded
Statistical analysis carried out only on one group (Caucasian)
24 males and 47 females recruited

113

Sterrett JD et al. Width/length ratios of normal clinical crowns of the maxillary anterior dentition in man. J.Clin.Periodontol.1999:26:153-157

RESULTS: Mean width/length ratios, standard deviations and range.

Gender	Central	Lateral	Canine
Male	0.85 (0.09)	0.76(0.09)	0.77(0.08)
(range)	0.65–1.02	0.63-1.04	0.66-0.97
Female	0.86 (0.07)	0.79 (0.09)	0.81 (0.07)
(range)	0.72-1.04	0.64-1.00	0.68-0.97

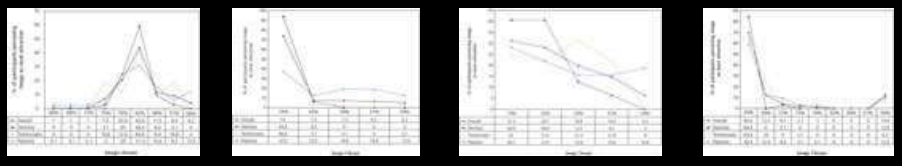
114

Sterrett JD et al. Width/length ratios of normal clinical crowns of the maxillary anterior dentition in man. J.Clin.Periodontol.1999:26:153-157

CONCLUSIONS: Within male and female Caucasians, the mean width/height ratio of the three maxillary tooth groups is 0.81

115

Recent research confirms 82% width to height ratio as most attractive for central incisors



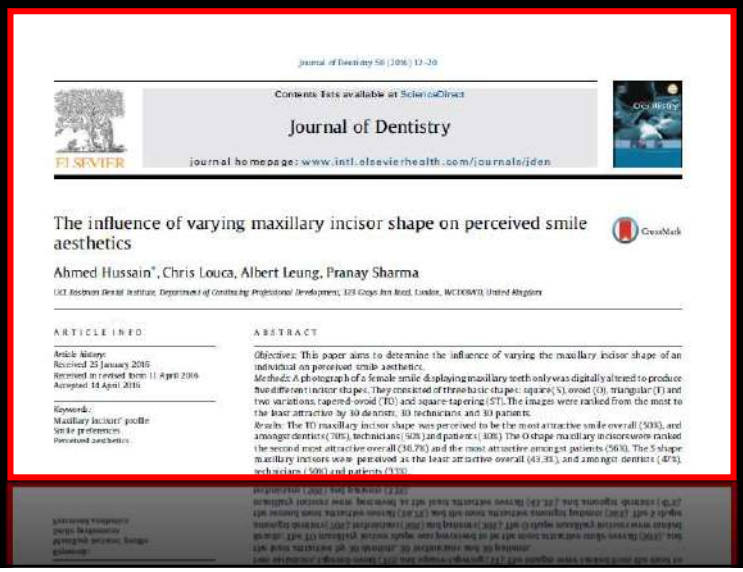
- Highlights differences in perception of dental aesthetics between dentists, technicians and patients.
- Stresses that patients are generally less concerned about dental appearance than dentists or technicians.
- Suggests 82% is the most attractive width-to-height ratio for normal central incisors for the majority of patients

The influence of maxillary central incisor height-to-width ratio on perceived smile aesthetics

G. E. Cooper, C. J. Tredwin, N. T. Cooper, A. Petrie & D. S. Gill
British Dental Journal 212, 589 - 599 (2012)

116

New research on incisor shape: which do dentists,patients & technicians prefer?



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The influence of varying maxillary incisor shape on perceived smile aesthetics

Ahmed Hussain*, Chris Louca, Albert Leung, Pranay Sharma

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Perceived aesthetics

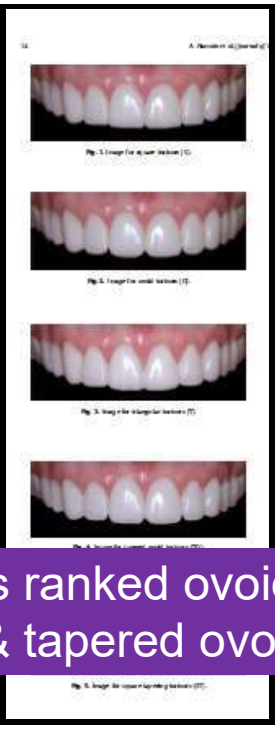
ABSTRACT

Objectives: This paper aims to determine the influence of varying the maxillary incisor shape of an individual on perceived smile aesthetics.

Methods: A photograph of a female smile displaying maxillary teeth only was digitally altered to produce five different incisor shapes. They consisted of three basic shapes: square (S), ovoid (O), triangular (T) and two variations: tapered-ovoid (TO) and square-tapering (ST). The images were ranked from the most to the least attractive by 30 dentists, 30 technicians and 30 patients.

Results: The TO maxillary incisor shape was perceived to be the most attractive smile overall (50%), and amongst dentists (70%), technicians (50%) and patients (30%). The O shape maxillary incisors were ranked the second most attractive overall (30.7%) and the most attractive amongst patients (56%). The S shape maxillary incisors were perceived as the least attractive overall (43.3%), and amongst dentists (40%), technicians (50%) and patients (53%).

117



Overall, tapered ovoid ranked as most attractive (70%)
Square tapering least attractive (41%)

Patients ranked ovoid as most attractive (56%) & tapered ovoid as second (20%)

118

Width to length ratios:

There is wide variability in the literature, but around 0.70 to 0.80 seems to have the vote

119

Trevor's view:

Other than symmetry of the central incisor teeth, there is no real consensus with regard to tooth dimensions.

120

measuring tooth wear

Study casts

121

- 100 patients examined in 2 studies
- Acceptable levels of tooth wear defined for different age groups
- Acceptable levels of tooth wear defined for cervical surfaces
- *Created scoring system*
- Defined “pathological tooth wear”

Smith BGN, Knight JK. An Index for Measuring the Wear of Teeth
Br.Dent.J.1984:156:435-440,

122

Score	Surface	Criterion
0	B/L/O/I/C	No loss of enamel surface characeristics. No change of contour.

Score	Surface	Criterion
2	B/L/O	Loss of enamel exposing dentine for <one third of surface.
	I	enamel dentine <1mm

Trevor's view: not easy to remember/use

Score	Surface	Criterion
4	B/L/O	Complete loss of enamel or pulp exposure.
	I	Pulp exp or exp of 2ary dentine
	C	Defect >2 mm or pulp exposure

Smith BGN, Knight JK. An Index for Measuring the Wear of Teeth
Br.Dent.J.1984:156:435-440,

123

Measuring tooth wear

The BEWE scoring system is a help

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BEWE: Basic Erosive Wear Examination
Bartlett D. Br.Dent.J.2010:208:204-209

A proposed system for screening tooth wear

D. Bartlett[1]

IN BRIEF

- Presents a convenient and simple way to record tooth wear in practice.
- The four levels in the proposed system can be easily understood.
- Simple associated treatment options give additional help.

PRACTI

tive scores is arbitrary. They are not based on research but on clinical experience of the authors of the original article.[15]

increases the timing of monitoring becomes more frequent and the possibility of restorations develops.

1. Fares J, Chiu K, Ahmad N, Shirodaria S, Bartlett D W. A new index of tooth wear. Reproducibility and application to a sample of 18–30 year old university students. *Caries Res* 2009; 43: 119–125.
2. Bardsley P F, Taylor S, Milosevic A. Epidemiological studies of tooth wear and dental erosion in 14-year-old children in North West England. Part 1: The relationship with water fluoridation and social deprivation. *Br Dent J* 2004; 197: 413–416.
3. Bartlett D W, Coward P Y, Nikkah C, Wilson R F. The prevalence of tooth wear in a cluster sample of adolescent schoolchildren and its relationship
15. Bartlett D, Ganss C, Lussi A. Basic Erosive Wear Examination (BEWE): a new scoring system for scientific and clinical needs. *Clin Oral Investig* 2008; 12: 65–68.

BRITISH DENTAL JOURNAL VOLUME 208 NO. 5 MAR 13 2010 209

less than 50% of the surface involved and the BEWE score would be 2. The same score would be given to the lower anterior quadrant. From what is visible on the right side the level of wear on the premolars and molar would also be less than 50% of the surface and so another score of 2 would be given. If the pattern was repeated on all six quadrants the cumulative score would be 8 indicating level 2 and the management would focus around prevention

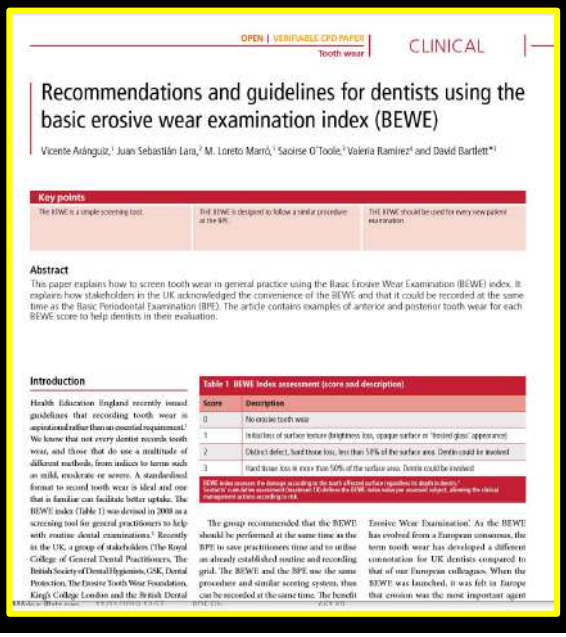
the higher levels indicating greater severity need further evaluation and treatment.

Consequently the divisions may vary between national boundaries around the

7. Lussi A, Jaeggi T, Zero D. The role of diet in the aetiology of dental erosion. *Caries Res* 2004; 38(Suppl 1): 34–44.
8. Moazzez R, Smith B G N, Bartlett D W. Oral pH and drinking habit during ingestion of a carbonated drink in a group of adolescents with dental erosion. *J Dent* 2000; 28: 395–397.
9. Bartlett D W. The role of erosion in tooth wear: aetiology, prevention and management. *Int Dent J* 2005; 55(4 Suppl 1): 277–284.

125

BEWE made easy



OPEN | VERIFIABLE CPD PAPER | CLINICAL

Tooth wear

Recommendations and guidelines for dentists using the basic erosive wear examination index (BEWE)

Vicente Aránguiz,[1] Juan Sebastián Lara,[2] M. Loreto Marró,[1] Saoirse O'Toole,[3] Valeria Ramírez[4] and David Bartlett*[3]

Key points

Abstract

This paper explains how to screen tooth wear in general practice using the Basic Erosive Wear Examination (BEWE) index. It explains how stakeholders in the UK acknowledged the convenience of the BEWE and that it could be recorded at the same time as the Basic Periodontal Examination (BPE). The article contains examples of anterior and posterior tooth wear for each BEWE score to help dentists in their evaluation.

Introduction

Table 1 BEWE Index assessment (score and description)

Score	Description
0	No erosive tooth wear
1	Initial loss of surface texture (brightness loss, opaque surface or 'frosted glass' appearance)
2	Distinct defect, hard tissue loss, less than 50% of the surface area. Dentin could be involved
3	Hard tissue loss in more than 50% of the surface area. Dentin could be involved

BEWE index assesses the damage according to the tooth affected surface regardless its depth in dentin.[2] Sextants' cumulative assessment (maximum 18) defines the BEWE index value per assessed subject, allowing the clinical management actions according to risk.

Health Education England recently issued guidelines that recording tooth wear is aspirational rather than an essential requirement.[1] We know that not every dentist records tooth wear, and those that do use a multitude of different methods, from indices to terms such as mild, moderate or severe. A standardised format to record tooth wear is ideal and one that is familiar can facilitate better uptake. The BEWE index (Table 1) was devised in 2008 as a screening tool for general practitioners to help with routine dental examinations.[2] Recently in the UK, a group of stakeholders (The Royal College of General Dental Practitioners, The British Society of Dental Hygienists, GSK, Dental Protection, The Erosive Tooth Wear Foundation, King's College London and the British Dental

The group recommended that the BEWE should be performed at the same time as the BPE to save practitioners time and to utilise an already established routine and recording grid. The BEWE and the BPE use the same procedure and similar scoring system, thus can be recorded at the same time. The benefit

Erosive Wear Examination'. As the BEWE has evolved from a European consensus, the term tooth wear has developed a different connotation for UK dentists compared to that of our European colleagues. When the BEWE was launched, it was felt in Europe that erosion was the most important agent

Table 1 BEWE Index assessment (score and description)

Score	Description
0	No erosive tooth wear
1	Initial loss of surface texture (brightness loss, opaque surface or 'frosted glass' appearance)
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BEWE index assesses the damage according to the tooth affected surface regardless its depth in dentin.[2] Sextants' cumulative assessment (maximum 18) defines the BEWE index value per assessed subject, allowing the clinical management actions according to risk.

Br.Dent.J 2020:228:153-157

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Pathogenesis of erosive tooth wear

ACID + TEETH
minus PROTECTIVE EFFECTS
=

Demineralisation

Demineralisation occurs at a pH of less than 5

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Citric Acid

- Three H+ ions
- Very erosive
- Chelating agent - chelates calcium

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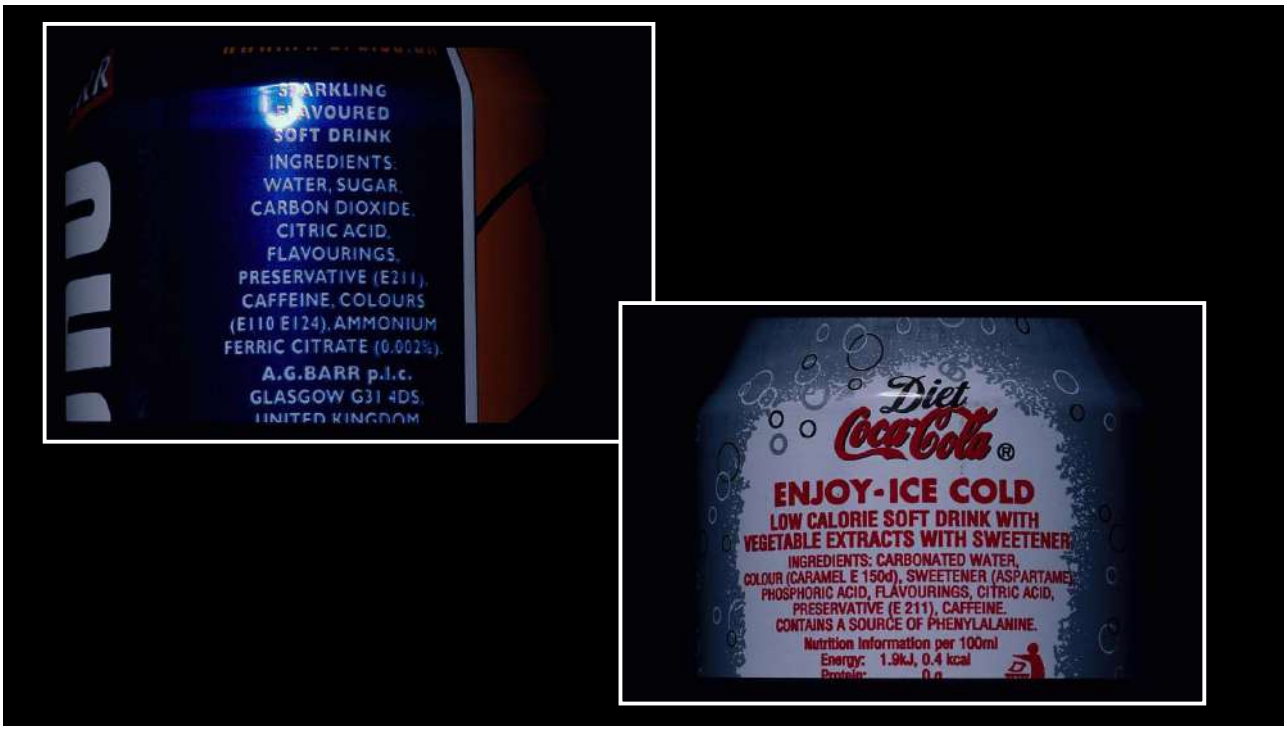
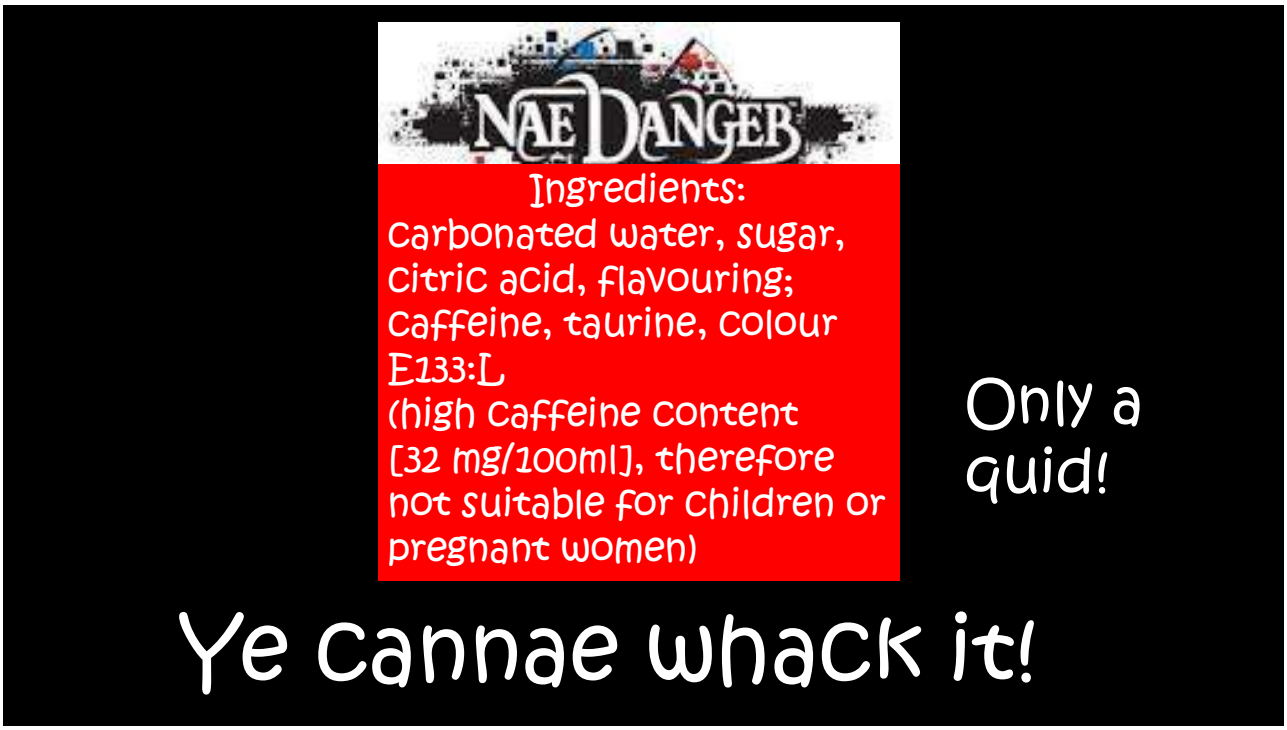

SPARKLING
FLAVOURED
SOFT DRINK
INGREDIENTS:
WATER, SUGAR,
CARBON DIOXIDE,
CITRIC ACID,
FLAVOURINGS,
PRESERVATIVE (E211),
CAFFEINE, COLOURS
(E110 E124), AMMONIUM
FERRIC CITRATE (0.002%).
A.G.BARR p.l.c.
GLASGOW G31 4DS
UNITED KINGDOM
Diet Coca-Cola
ENJOY-ICE COLD
LOW CALORIE SOFT DRINK WITH
VEGETABLE EXTRACTS WITH SWEETENER
INGREDIENTS: CARBONATED WATER,
COLOUR (CARAMEL E 150d), SWEETENER (ASPARTAME),
PHOSPHORIC ACID, FLAVOURINGS, CITRIC ACID,
PRESERVATIVE (E 211), CAFFEINE.
CONTAINS A SOURCE OF PHENYLALANINE.
Nutrition Information per 100ml
Energy: 1.9kJ, 0.4 kcal

129


NAE DANGER
Ingredients:
carbonated water, sugar, citric acid, flavouring; caffeine, taurine, colour E133:L
(high caffeine content [32 mg/100ml], therefore not suitable for children or pregnant women)
Only a quid!
Ye cannae whack it!

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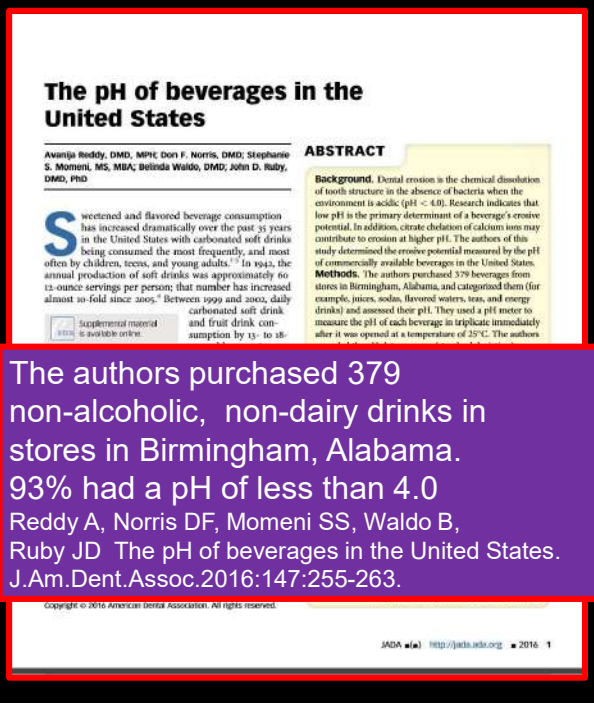
Name of drink	pH
Lemon juice	2.25
Ocean spray Cranberry	2.56
Barber's orange juice	3.61
Minute Maid Natural Energy Mango	3.34
Juicy juice apple	3.64
Tropicana grape juice	3.29
Simply lemonade	2.61
Coca Cola Zero	2.96
Coca Cola Classic	2.37
Coca Cola Cherry	2.38
Pepsi	2.39
Pepsi Max	2.74



The pH of beverages in the United States

Avanija Reddy, DMD, MPH; Don F. Norris, DMD; Stephanie S. Momeni, MS, MBA; Belinda Waldo, DMD; John D. Ruby, DMD, PhD

ABSTRACT

Background. Dental erosion is the chemical dissolution of tooth structure in the absence of bacteria when the environment is acidic (pH < 4.0). Research indicates that low pH is the primary determinant of a beverage's erosive potential. In addition, citrate chelation of calcium ions may contribute to erosion at higher pH. The authors of this study determined the erosive potential measured by the pH of commercially available beverages in the United States.

Methods. The authors purchased 379 beverages from stores in Birmingham, Alabama, and categorized them (for example, juices, sodas, flavored waters, teas, and energy drinks) and assessed their pH. They used a pH meter to measure the pH of each beverage in triplicate immediately after it was opened at a temperature of 25°C. The authors

Sweetened and flavored beverage consumption has increased dramatically over the past 35 years in the United States with carbonated soft drinks being consumed the most frequently, and most often by children, teens, and young adults.[1-3] In 1942, the annual production of soft drinks was approximately 60 12-ounce servings per person; that number has increased almost 10-fold since 2005.[4] Between 1999 and 2002, daily carbonated soft drink and fruit drink consumption by 13- to 18-

Supplemental material is available online.

The authors purchased 379 non-alcoholic, non-dairy drinks in stores in Birmingham, Alabama.
93% had a pH of less than 4.0
Reddy A, Norris DF, Momeni SS, Waldo B, Ruby JD The pH of beverages in the United States. J.Am.Dent.Assoc.2016:147:255-263.

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Brief conclusion:
drinks may be a major cause of erosion

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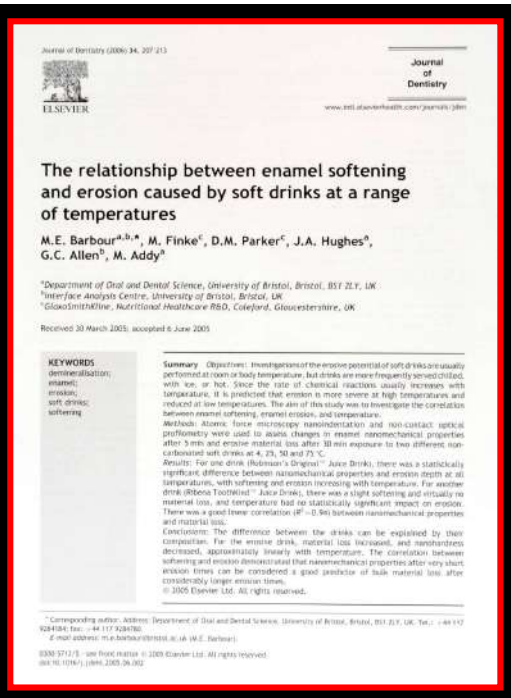

Journal of Dentistry

ELSEVIER

The relationship between enamel softening and erosion caused by soft drinks at a range of temperatures

M.E. Barbour[a,b,*], M. Finke[c], D.M. Parker[c], J.A. Hughes[a], G.C. Allen[b], M. Addy[a]

[a]Department of Oral and Dental Science, University of Bristol, Bristol, BS1 2LY, UK
[b]Interface Analysis Centre, University of Bristol, Bristol, UK
[c]GlaxoSmithKline, Nutritional Healthcare R&D, Coleford, Gloucestershire, UK

Received 30 March 2005; accepted 6 June 2005

KEYWORDS
demineralisation;
enamel;
erosion;
soft drinks;
softening

Summary *Objectives*: Investigations of the erosive potential of soft drinks are usually performed at room or body temperature, but drinks are more frequently served chilled, with ice, or hot. Since the rate of chemical reactions usually increases with temperature, it is predicted that erosion is more severe at high temperatures and reduced at low temperatures. The aim of this study was to investigate the correlation between enamel softening, enamel erosion, and temperature.
Methods: Atomic force microscopy nanoindentation and non-contact optical profilometry were used to assess changes in enamel nanomechanical properties after 5 min and erosive material loss after 30 min exposure to two different non-carbonated soft drinks at 4, 25, 50 and 75 °C.
Results: For one drink (Robinson's Original™ Juice Drink), there was a statistically significant difference between nanomechanical properties and erosion depth at all temperatures, with softening and erosion increasing with temperature. For another drink (Ribena ToothKind™ Juice Drink), there was a slight softening and virtually no material loss, and temperature had no statistically significant impact on erosion. There was a good linear correlation (R^2=0.94) between nanomechanical properties and material loss.
Conclusions: The difference between the drinks can be explained by their composition. For the erosive drink, material loss increased, and nanohardness decreased, approximately linearly with temperature. The correlation between softening and erosion demonstrated that nanomechanical properties after very short erosion times can be considered a good predictor of bulk material loss after considerably longer erosion times.
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E-mail address: m.e.barbour@bristol.ac.uk (M.E. Barbour).

0300-5712/$ - see front matter © 2005 Elsevier Ltd. All rights reserved.
doi:10.1016/j.jdent.2005.06.002

Better *COLD!*

Summary *Objectives*: Investigations of the erosive potential of soft drinks are usually performed at room or body temperature, but drinks are more frequently served chilled, with ice, or hot. Since the rate of chemical reactions usually increases with temperature, it is predicted that erosion is more severe at high temperatures and reduced at low temperatures. The aim of this study was to investigate the correlation between enamel softening, enamel erosion, and temperature.
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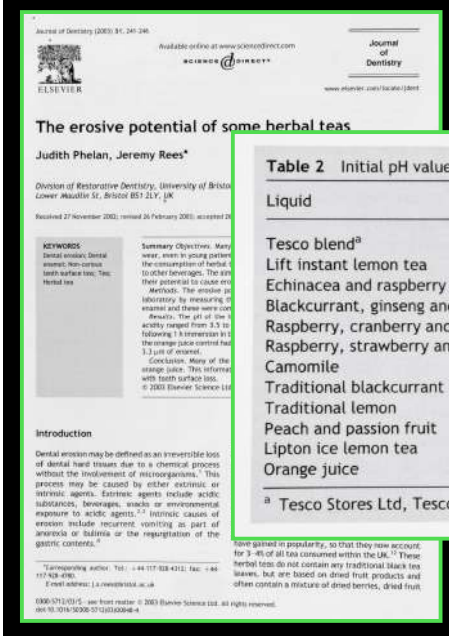
Problems with tea too!



Journal of Dentistry

ELSEVIER

The erosive potential of some herbal teas

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KEYWORDS
Dental erosion; Dental enamel; Non-carious tooth surface loss; Tea; Herbal tea

Introduction

Dental erosion may be defined as an irreversible loss of dental hard tissues due to a chemical process without the involvement of microorganisms.[1] This process may be caused by either extrinsic or intrinsic agents. Extrinsic agents include acidic substances, beverages, snacks or environmental exposure to acidic agents.[2,3] Intrinsic causes of erosion include recurrent vomiting as part of anorexia or bulimia or the regurgitation of the gastric contents.[4]

have gained in popularity, so that they now account for 3–4% of all tea consumed within the UK.[12] These herbal teas do not contain any traditional black tea leaves, but are based on dried fruit products and often contain a mixture of dried berries, dried fruit

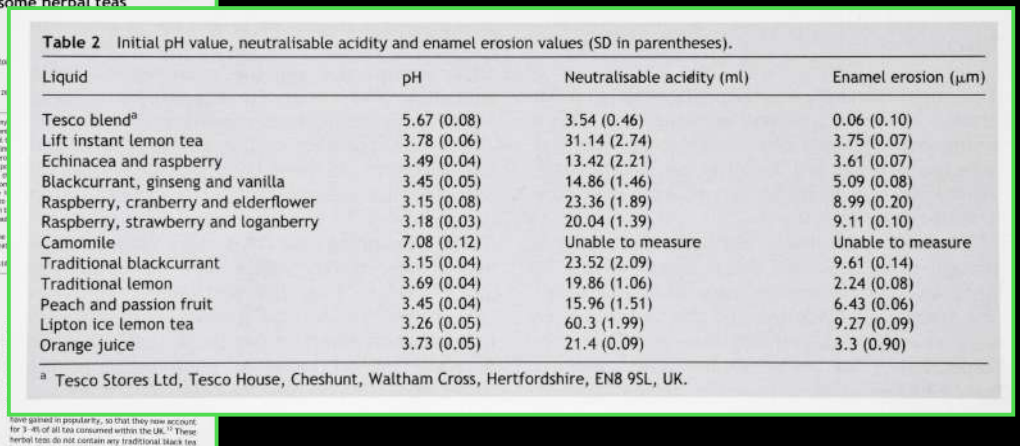

Table 2 Initial pH value, neutralisable acidity and enamel erosion values (SD in parentheses).

Liquid	pH	Neutralisable acidity (ml)	Enamel erosion (μm)
Tesco blend[a]	5.67 (0.08)	3.54 (0.46)	0.06 (0.10)
Lift instant lemon tea	3.78 (0.06)	31.14 (2.74)	3.75 (0.07)
Echinacea and raspberry	3.49 (0.04)	13.42 (2.21)	3.61 (0.07)
Blackcurrant, ginseng and vanilla	3.45 (0.05)	14.86 (1.46)	5.09 (0.08)
Raspberry, cranberry and elderflower	3.15 (0.08)	23.36 (1.89)	8.99 (0.20)
Raspberry, strawberry and loganberry	3.18 (0.03)	20.04 (1.39)	9.11 (0.10)
Camomile	7.08 (0.12)	Unable to measure	Unable to measure
Traditional blackcurrant	3.15 (0.04)	23.52 (2.09)	9.61 (0.14)
Traditional lemon	3.69 (0.04)	19.86 (1.06)	2.24 (0.08)
Peach and passion fruit	3.45 (0.04)	15.96 (1.51)	6.43 (0.06)
Lipton ice lemon tea	3.26 (0.05)	60.3 (1.99)	9.27 (0.09)
Orange juice	3.73 (0.05)	21.4 (0.09)	3.3 (0.90)

[a] Tesco Stores Ltd, Tesco House, Cheshunt, Waltham Cross, Hertfordshire, EN8 9SL, UK.

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Problems with sports drinks too!

J. REES, T. LOYN AND R. MCANDREW

Table 2. *Initial pH value, neutralisable acidity and enamel erosion values (SD in parentheses)*

Drink	*pH*	*Neutralisable acidity (mls)*	*Enamel erosion (microns)*
Lucozade™ sport orange	3.34 (0.05)	12.57(1.21)	4.18 (0.70)
Lucozade™ hydroactive citrus fruit	3.70 (0.01)	9.74(0.21)	1.18 (0.22)
Lucozade™ sport mixed berry	3.16 (0.05)	12.40(0.19)	5.36 (2.75)
Lucozade™ sport mixed citrus	3.22 (0.07)	13.44(0.15)	5.34 (2.46)
Powerade™ ice storm	3.24 (0.05)	10.8 (0.6)	3.14 (1.55)
Water	6.58 (0.07)	0.01(0.001)	0.15 (0.03)
Tropicana™ orange juice	3.68 (0.04)	19.68(0.31)	3.24 (0.62)

to a positive control, orange juice and a negative control, water. The pH of the sports drinks ranged from 3.16–3.70 with their neutralisable acidity ranging from 9.74–13.44 mls of 0.1M NaOH. The amount of enamel removed following 1-hour immersion in the sports drinks ranged from 1.18–5.36 microns. In comparison, the orange juice control had a pH of 3.68, a neutralisable acidity of 19.68 mls of 0.1 M NaOH and removed 3.24 microns of enamel. Many of the sports drinks tested were found to be erosive. This information will be of use to clinicians when counselling patients with tooth surface loss who use fruit based sports drinks regularly.

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CLINICAL PRACTICE

CASE REPORT

Dental erosion due to wine consumption

LOUIS MANDEL, D.D.S.

Background. Dental erosions can result from numerous causes, but extrinsic dietary factors are the most common. Because of wine's acidity, it may have a deleterious effect on teeth. Its use must be considered during an evaluation of erosive dental changes.

Case Description. The author examined a 56-year-old woman because her referring dentist had noted extensive erosive loss of tooth structure, mainly enamel. The author eliminated the usual causes of dental erosion. It was only after a detailed history was obtained and dietary investigation was undertaken that the author determined that the amount, manner and timing of the patient's wine drinking was the cause of the problem.

Dental erosion is defined as a superficial loss of tooth substance by a chemical process that does not involve bacteria.[1] The resulting chemical etching usually reflects the effect of

Dentists should be aware that wine could be a cause of dental erosion

inappropriate use of wine can lead to extensive dental erosions.

Exposure to high levels of hydrochloric acid in improperly maintained chlorinated swimming pools also has been reported as a cause of erosion.[1,9] Furthermore, acid erosion can result from the prolonged oral retention of medications. Oral misuse of medications such as hydrochloric acid tablets,[1,2] aspirin (acetylsalicylic acid)[1,3,10] and vitamin C (ascorbic acid)[1,3] and

has been reported to range from 3.0 to 3.8,[1,10,11] with white wine being slightly more acidic than red wine.[1,10] Wine derives its acidity mostly from its contained tartaric and malic acids and from smaller concentrations of citric and succinic acids.[12,13] Because the critical point at which enamel dissolves is

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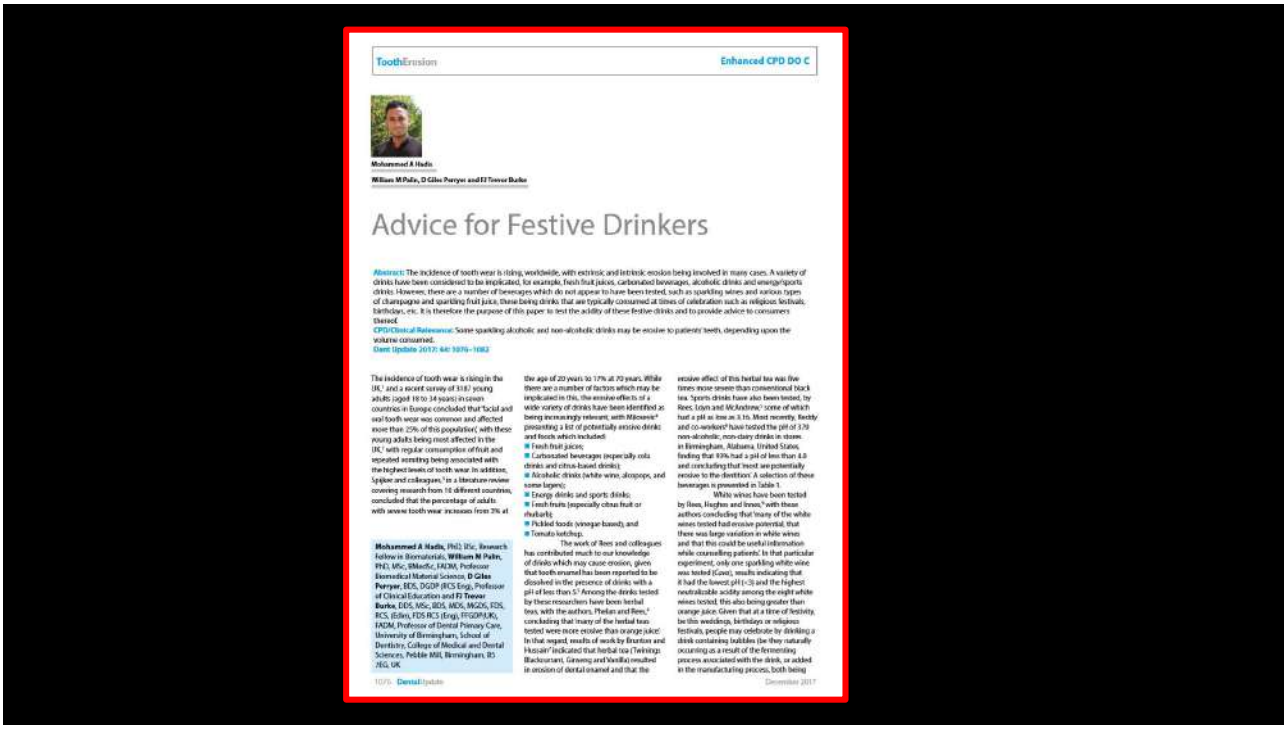

ToothErosion Enhanced CPD DO C

Advice for Festive Drinkers

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Drinks tested:bubbles!

- Sparkling water
- Schweppes Tonic water
- Schweppes Slimline Tonic water
- Bucks Fizz (Winemakers selection by Sainsburys) 4% vol
- Shloer Non alcoholic sparkling white grape juice
- Alska Nordic berries cider (Swedish Cider Company, Stockholm) 4.0% vol
- Orchard Premium Irish Cider 4.5% vol
- Asti Vino Spumante Dolce (S.Orsola) 7% vol
- Prosecco Extra dry (Valdobbiadene) 11% vol
- Champagne Monsigny Brut (Philizot et fils) 12% vol
- Lanson Brut Rose (Reims France) 12.5% vol
- Saumur Rose Brut (Bouvet , Saumur)
- Sparkling natural mineral water (Badoit, Saint Galmier, France)
- Soda water

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Don’t worry!

The most expensive drink was the most erosive!!

Drinks with bubbles might be bad for your teeth!!

Rose sparkling wine and rose champagne seem to be worst!

139

Don’t worry!

Of course, as well as pH and neutralizable acidity, it’s also a volume thing

There may also be other health hazards

140

Sour sweets too!

141

Investigation of the erosive potential of sour novelty sweets

A. Aljawad,*[1] M. Z. Morgan,[2] R. Fairchild[3] and J. S. Rees[4]

In brief

Provides a background about the link between acidic beverages and dental erosion.	Discusses the potential risk of developing dental erosion upon the frequent consumption of novelty sweets.	Provides information which could be used by dental personnel in counselling patients who consume novelty sweets or at risk of developing dental erosion.

Background The expansion of the novelty sweets market in the UK has major potential public health implications in children and young adults as they may cause dental erosion. **Objective** To investigate the erosive potential of the novelty sweets in term of their physiochemical properties and amount of enamel loss. **Subjects and methods** The pH of a variety of

pH ranged from 1.8 to 3.2

and from 2.5–17.6 μm with and without immersing in saliva for 1 hour before immersing in acidic solution respectively. The amount of subsurface enamel loss was ranged from 0.75 to 2.3 μm following ultrasonication at 0 min of acidic attack and from 0.23 to 0.85 μm at 60 minutes of acidic attack while immersed in saliva. The contact angle between enamel surface and four sweet was less than the angle formed between the orange juice and the enamel which caused more wettability of enamel. **Conclusion** The pH is lower than the critical value for enamel erosion (5.5), high neutralisable acidity and high sugar content strongly suggest that these sweets may cause significant amount of dental erosion clinically. In addition, the degree of wettability of enamel by solution is an important factor to consider in determining the enamel loss caused by acidic solution. Immediate tooth brushing would cause further enamel loss as a result of the mechanical removal of softened enamel. However, it has been suggested that postponing brushing after erosive attack should be reconsidered.

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Is erosion an increasing problem?

YES!

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Tooth wear – brief revision time!

The most difficult cases generally involve two or more of these

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Abrasion

Mosby's Dental Dictionary, 2004

- The grinding or wearing away of tooth substance by mastication, incorrect brushing, bruxism, or similar causes

Normally involves foreign objects

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Attrition

Mosby's Dental Dictionary, 2004

The normal loss of tooth substance resulting from friction caused by physiological forces

- Rubbing together of like to like surfaces
- Physiological tooth to tooth contact
- Severity related to age, diet, parafunction, lack of posterior support

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Erosion

Mosby's Dental Dictionary, 2004

- The chemical or mechanicochemical destruction of tooth substance, the mechanism of which is incompletely known, which leads to the creation of concavities and many shapes at the cementoenamel junction of teeth. The surface of the cavity, unlike dental caries, is hard and smooth.

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Erosion: Aetiology

- Extrinisic
- Intrinsic
- Idiopathic

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Other causes of erosion: medicinal causes

- HCl replacement
- Iron tonics
- Chewable Vitamin C
- Salivary stimulants (glycerine/lemon mouthwash

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Other causes of erosion: regurgitational erosion

- Anorexia nervosa
- Bulimia
- Voluntary reflux phenomenon (regurgitation and swallowing)
- Occasional sickness (pregnancy sickness: alcohol-induced vomiting)
- GORD

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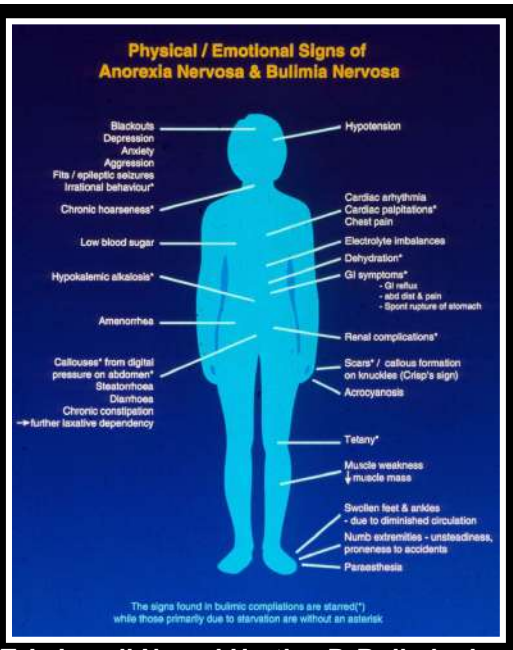

Burke F.J.T., Bell T.J., Ismail N. and Hartley P. Bulimia: implications for the practising dentist. Br. Dent. J. 1996; 180; (11); 421-426.

151

GORD: Medical management

- Lifestyle changes – reduce consumption of fatty/spicy foods
- Use of antacids such as Milk of Magnesia, H_2 antagonists such as *Cimetidine*
- Treatment – referral to gastroenterologist, use protein pump inhibitors such as *Omeprazole*
- Surgery – *Nissen Fundoplication* – to tighten lower oesophageal sphincter

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Dental erosion: alcoholism

- Common problem: lifetime risk of alcoholism is 10% for males and 4% for females
- Gastritis, oesophagitis
- Often symptom free – patients don't admit problem
- 92% of chronic alcoholics have erosional TSL:
  - palatal of incisors
  - palatal and occlusal of maxillary teeth
  - mandibular teeth are generally protected

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…another cause of tooth wear

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RestorativeDentistry

Richard Porter
Neil Poyser, Harpal Chana
Martin Kelleher and Manish Patel

Self-Inflicted Dental Injury Presenting as Localized Anterior Tooth Surface Loss

Abstract: A case of localised anterior tooth surface loss (TSL) with an unusual aetiology is reported. Whilst suffering from a bout of acute depression and anxiety, a 29-year old female caused significant trauma to her anterior dentition with a pair of fabric scissors. The presentation and management of this case is described.
Clinical Relevance: Although tooth surface loss is a common clinical finding in many patient groups, practitioners should be aware of possible unusual aetiologies which may be involved.
Dent Update 2006; 33: 154-156

A 29-year-old Asian female was referred to the Department of Restorative Dentistry at St George's Hospital regarding anterior tooth surface loss (TSL). She presented complaining of sensitivity associated with chipped and roughened anterior teeth.

She also reported that gaps had appeared between the incisal surfaces of opposing anterior teeth and that her speech had altered. The symptoms had been present for several weeks and had not changed in severity since their onset. She was keen to have her teeth restored for both functional and aesthetic reasons.

The patient's medical history was clear and she was in full-time employment as a legal clerk. She was married, although openly admitted her marriage was a source of great unhappiness for her.

Generally, the patient appeared healthy and relaxed. An extra-oral examination revealed nothing abnormal and, intra-orally, oral hygiene was fair. The few posterior restorations that were present were satisfactory. Soft tissues were healthy and well lubricated. The anterior teeth showed significant areas of TSL (Figure 1). The distribution of the TSL extended from canine to canine in both maxillary and mandibular arches and predominantly affected the incisal surfaces of these teeth.

The residual tooth tissue had an uneven ragged surface which could not be readily attributed to either erosion or attrition.

On questioning, the patient initially alluded to the possibility of some sort of foreign object being used to alter her teeth. Further use of open-ended questions led the patient to admit to an episode of self-harm.

She reported that she was under intense stress professionally and in her personal life. Her unhappy marriage coupled with work pressures and the feeling of being trapped with no one to talk to led her to inflict damage to her teeth. The patient reported that, after work one evening, she took a pair of fabric scissors (Figure 2) and 'attacked' her teeth with them. The episode of self-harm lasted a few minutes and culminated in an emotional breakdown. This episode had not been discussed by the patient with her family and, indeed, at this stage, it was only dental professionals in whom the patient had confided.

The patient denied any previous episodes of self-harm and had no history of mental illness. She explained that she felt 'emotionally removed from herself' and her state of mind during the episode of self-

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Signs of erosive activity

- Sensitivity
- Loss of surface anatomy
- Cupped surfaces
- Chipped incisal edges, incisal translucency
- Loss of palatal enamel

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Signs of erosive activity

- Unstained surfaces

NOTE:

If the dentine surface is stained, there has been sufficient time for teeth to take up stains from coffee, ***red*** wine, nicotine, etc., therefore urgency of treatment decreases.

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Biologic factors modifying the erosive process

- Saliva
- Dental anatomy/tooth composition
- Occlusion
- Soft tissue movements

Most important factors:
Unstimulated salivary flow rate
Buffering capacity

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Tooth composition & structure

- Wide variations in hard tissue composition (Meurman, 1986)
- Variations in response of enamel to erosive attack (Mannerberg 1962)
- Fluoridation plays a part

159

Dental anatomy & occlusion

- Shape & contour of teeth modify the erosive process (Thomas 1957)
- Parafunction can increase the wearing effects of erosion (& vice versa) (Lewis and Smith, 1973)
- Tooth flexure (Levitch et al., 1994

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Soft tissue physiology

- Relationship of soft tissues to tooth surface will influence acid contact on teeth
- The tongue likewise (Jarvinen et al., 1992)

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Advice for patients with an erosive element to their diet

- Reduce the amount & frequency of intake
- Avoid “frothing” or swishing drinks
- Avoid brushing teeth at least 30mins after drinking
- Chill the drink
- Avoid such drinks before bedtime or during the night

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Tooth wear: when to treat

- Sensitivity
- Progression
- Appearance (secondary to covering dentine surfaces)
- (Function)

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Briefly, which composite should we use?
And, do we need a matrix?

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Composite filler particles


RestorativeDentistry

EJ Trevor Burke

Louis Mackenzie and Peter Sands

Dental Materials – What Goes Where? Class I and II Cavities

Abstract: Dental amalgam has helped maintain dental public health in the developed world for over a century. However, its days appear to be numbered. Notwithstanding the environmental consideration, there is an ever increasing demand from dental patients for non-metallic and tooth-coloured restoratives in their posterior teeth. This paper gives a brief history of dental amalgam and critically appraises the alternative materials, the principal of these being resin-based composite.

Clinical Relevance: The majority of practitioners carry out large numbers of Class I and II restorations, so an appraisal of the pros and cons of the alternatives may assist in decision-making.

Dent Update 2013; 40: xxx–xxx

The first issue of *Dental Update* contained a paper on pinned retention for amalgam and, while the current status of pins is also discussed in this issue, this paper aims to examine the current status of dental amalgam and alternatives for directly placed Class I and II restorations.

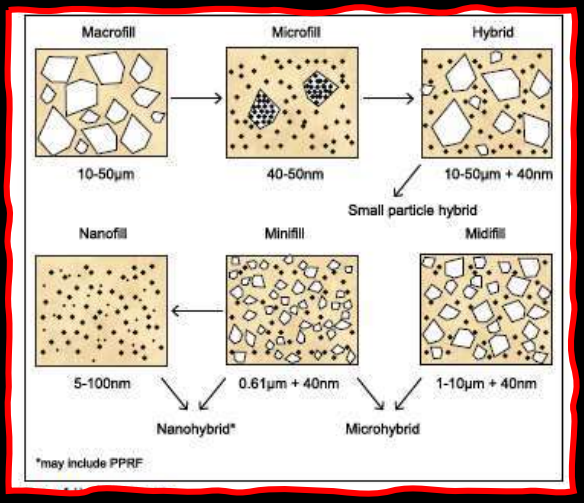
The current status of dental amalgam

A brief history of dental amalgam

The history of amalgam is uncertain; however, there is a report of the use of a silver paste being used as early as 659AD in China[1] with its first use as a dental material being reported in France in 1826.[2] The years passed, with many other metals being combined with mercury, until GV Black produced a formula in 1895, for a dental amalgam which provided reasonable clinical performance. This remained unchanged for circa 70 years.[3] until Eames[4] recognized the benefit of a 1 to 1 ratio of mercury to alloy, thus allowing a substantial reduction from the levels previously recommended (as high as 6 to 1). High copper content alloys followed, with these creating a copper-tin phase which was less susceptible to corrosion than the tin-mercury gamma 2 phase present in low copper content alloys.[5]

The content of amalgam alloy, of which has differing handling properties, with spherical being considered to be the easiest to condense.[6] The alloy is then mixed with mercury (up to 50% by weight) to form the dental amalgam.

Alloys in which the mercury was completely or partially replaced by gallium, a metal which is liquid at room temperature in the same group of the periodic table as mercury, were introduced in the 1960s, becoming popular in the 1980s and 1990s after adverse publicity regarding mercury. One such material (Gallar; SDI, Melbourne, Australia) received the American Dental Association's Seal of Approval, but this was withdrawn when published research indicated that materials



165

Summary:composite for TW

- Sufficient number of shades & translucencies
- Enamel shade valuable when only rebuilding incisal edges
- Good polishability (low filler particle size)
- Non-slump and non-sticky materials facilitate easy freehand placement

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Should we use a putty matrix?

Yes, if the composite slumps and cannot be used freehand

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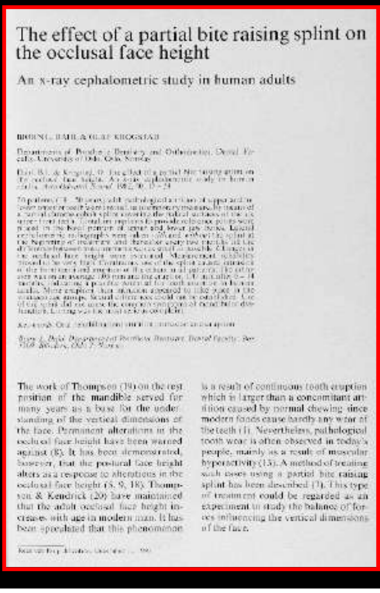
The "Dahl" approach



The effect of a partial bite raising splint on the occlusal face height

An x-ray cephalometric study in human adults

The work of Thompson (19) on the rest position of the mandible served for many years as a base for the understanding of the vertical dimensions of the face. Permanent alterations in the occlusal face height have been warned against (8). It has been demonstrated, however, that the postural face height alters as a response to alterations in the occlusal face height (5, 9, 18). Thompson & Kendrick (20) have maintained that the adult occlusal face height increases with age in modern man. It has been speculated that this phenomenon is a result of continuous tooth eruption which is larger than a concomitant attrition caused by normal chewing since modern foods cause hardly any wear of the teeth (1). Nevertheless, pathological tooth wear is often observed in today's people, mainly as a result of muscular hyperactivity (15). A method of treating such cases using a partial bite raising splint has been described (7). This type of treatment could be regarded as an experiment to study the balance of forces influencing the vertical dimensions of the face.

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…actually…

Anderson DJ. Tooth movement in experimental malocclusion. Archives Oral Biol. 1962 (7): 7-15

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TOOTH MOVEMENT
IN EXPERIMENTAL MALOCCLUSION

D. J. ANDERSON
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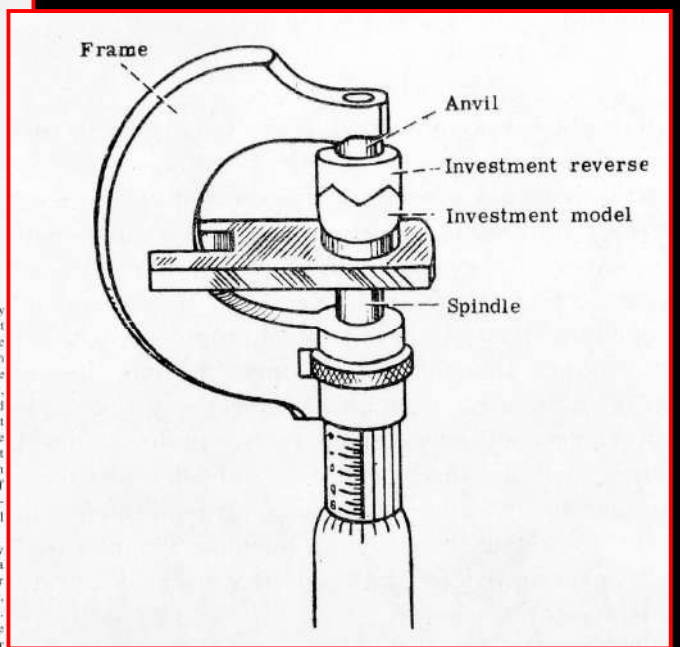
Abstract—In five human subjects, the occlusal surface of the right lower first permanent molar was raised by means of a removable metal cap approximately 0·5 mm thick. In every case the cap was an anatomical replica of the occlusal surface of the chosen tooth and was worn continuously without discomfort for 23–41 days. Immediately after insertion of the cap the subjects were unable to make contact anywhere with the jaws clenched except between the capped tooth and antagonists. Within a short period whole-arch centric occlusal contact became possible, and measurements between reference points on the capped tooth and antagonist and between other pairs of teeth show that adjustments in tooth position took place.

INTRODUCTION

WHEN a tooth is extracted, the unopposed antagonist usually erupts further to occupy part of the space previously filled by the lost tooth. Likewise, if occlusal contact between opposing teeth is lost as a result of the removal of tooth substance in the preparation of a crown restoration for example, the teeth frequently re-establish occlusal contact in the period elapsing before the restoration is inserted, unless the prepared tooth is covered by a temporary filling. From these common observations, it seems that even in adults, the teeth have a latent eruptive potential normally held in check by contact with their antagonists in the opposing arch, although this contact is intermittent. Yet there are many examples of arches in which teeth do not make contact with their opponents, although apparently free to do so, and the result must be that the masticatory loads are distributed over a smaller area than normal, with the possibility of trauma to the supporting tissues. It is of interest in the study of periodontal disease to investigate factors which influence the inter-occlusal relationship of teeth, and this paper provides data on tooth movement during experimental disturbance of this relationship.

ANDERSON and PICTON (1957) described acute experiments in which masticatory forces were measured in a tooth of which the occlusal surface had been raised by a metal cap approximately 0·5 mm thick. With the cap in position, this tooth, a lower first molar, was the only one in the arch which made contact with the upper dentition, yet the forces recorded did not differ greatly from those recorded without the cap. Furthermore, the subjects were able to wear the cap without discomfort. In the experiments to be reported here, five subjects wore a bite-raising cap on the lower right first molar for periods of up to 41 days, during which measurements were made to follow any alterations in the relative positions of the capped tooth and its opponent,



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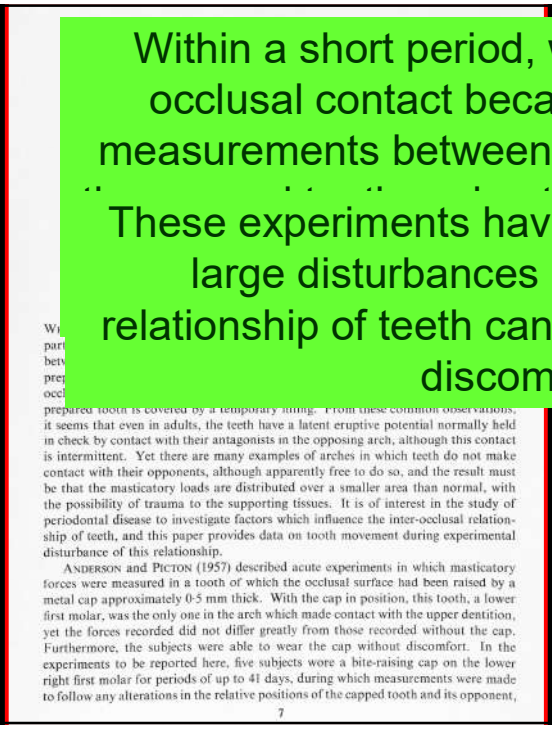

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7

Within a short period, whole-arch centric occlusal contact became possible, and measurements between reference points on

These experiments have demonstrated that large disturbances in inter-occlusal relationship of teeth can be tolerated without discomfort

Anderson DJ. Tooth movement in experimental malocclusion. Archives Oral Biol. 1962 (7): 7-15

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Dahl appliance

- First types were removable
- Later types cemented to teeth and removed
- Contemporary types use the permanent restoration to gain the space

These were made to obtain space for the restoration of worn teeth

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"Dahl" appliance (cemented) 2.5mm thick, is used for obtaining space for restorative materials on palatal of anterior teeth where posterior teeth are satisfactory

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Dahl Appliance

Eruption	60% of cases
Intrusion	35% of cases
Intrusion/eruption	5% of cases

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The first case report

175

An alternative treatment
in cases with advanced localised attrition.
Dahl BL, Krogstad O, Karlsen K. J.Oral Rehabil.1975:2:209-214.

"In an effort to avoid capping a great number of teeth, with its many jeopardising consequences, a technique has been developed by which the necessary space for the crown material has been obtained by orthodontic measures".

176

An alternative treatment in cases with advanced localised attrition.

Dahl BL, Krogstad O, Karlsen K. J.Oral Rehabil.1975:2:209-214.

"Male aged 18 years. Pink hue from underlying pulp apparent. Casts mounted on a Dentatus articulator.

Removable CoCr splint, approx 2mm thick fitted to cover the palatal surfaces of the upper front teeth

Patient instructed to wear the splint day and night.

Tantalum needles implanted near the midline of the basal portions of the upper & lower jaws".

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An alternative treatment in cases with advanced localised attrition.

Dahl BL, Krogstad O, Karlsen K. J.Oral Rehabil.1975:2:209-214.

"Lateral head plate radiographs taken after 2, 5 and 8 months.

After 4 weeks a space could clearly be observed between the upper and lower incisors when the splint was removed

The heavily worn palatal surfaces of the upper incisors were protected by means of gold pinlays.

The patient did not complain of any discomfort".

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The effect of a partial bite raising splint on the occlusal face height

An x-ray cephalometric study in human adults

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Departments of Prosthetic Dentistry and Orthodontics, Dental Faculty, University of Oslo, Oslo, Norway

Dahl, B.L. & Krogstad, O. The effect of a partial bite raising splint on the occlusal face height. An x-ray cephalometric study in human adults. *Acta Odontol. Scand.* 1982, 40, 17 – 24

20 patients (18 – 50 years) with pathological attrition of upper and/or lower anterior teeth were treated, as a temporary measure, by means of a partial chrome-cobalt splint covering the palatal surfaces of the six upper front teeth. Tantalum implants to provide reference points were placed in the basal portion of upper and lower jaw bones. Lateral cephalometric radiographs were taken *with* and *without* the splint at the beginning of treatment and thereafter every two months till the difference between measurements was as small as possible. Changes in the occlusal face height were evaluated. Measurement reliability proved to be very high. Continuous use of the splint caused intrusion of the front teeth and eruption of the others in all patients. The intrusion was on an average 1.05 mm and the eruption 1.47 mm after 6 – 14 months, indicating a possible potential for tooth eruption in human adults. More eruption than intrusion appeared to take place in the youngest age groups. Sexual differences could not be established. Use of the splint did not cause the common symptoms of mandibular dysfunction. Lisping was the most serious complaint.

Key words: Oral rehabilitation; attrition; intrusion and eruption

Bjørn L. Dahl, Department of Prosthetic Dentistry, Dental Faculty, Box 1109, Blindern, Oslo 3, Norway

The work of Thompson (19) on the rest position of the mandible served for many years as a base for the understanding of the vertical dimensions of the face. Permanent alterations in the occlusal face height have been warned against (8). It has been demonstrated, however, that the postural face height alters as a response to alterations in the occlusal face height (5, 9, 18). Thompson & Kendrick (20) have maintained that the adult occlusal face height increases with age in modern man. It has been speculated that this phenomenon is a result of continuous tooth eruption which is larger than a concomitant attrition caused by normal chewing since modern foods cause hardly any wear of the teeth (1). Nevertheless, pathological tooth wear is often observed in today's people, mainly as a result of muscular hyperactivity (13). A method of treating such cases using a partial bite raising splint has been described (7). This type of treatment could be regarded as an experiment to study the balance of forces influencing the vertical dimensions of the face.

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eruption of human teeth. The use of such a splint both day and night caused only short and transient discomfort for the wearer. This observation indicates that an increase of the occlusal face height, if necessary, is well tolerated in most cases.

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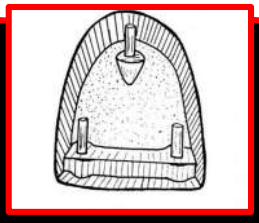
…after treatment with the "Dahl appliance": types of permanent restoration



- Oxidised gold castings
- Gold pinlays (Dahl, 1975)
- Palatal porcelain laminate veneers
- Palatal indirect composite veneers
- Directly placed resin composite

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Tooth wear treatment today

First give preventative advice

181

Preventive advice for patients with an erosive element to their diet

- Reduce the amount & frequency of intake
- Avoid “frothing” or swishing drinks
- Avoid brushing teeth at least 30mins after drinking
- Chill the drink
- Avoid such drinks before bedtime or during the night

182

Preventive advice for patients with an erosive element to their diet

- Explain that there is increasing evidence that some toothpastes may help

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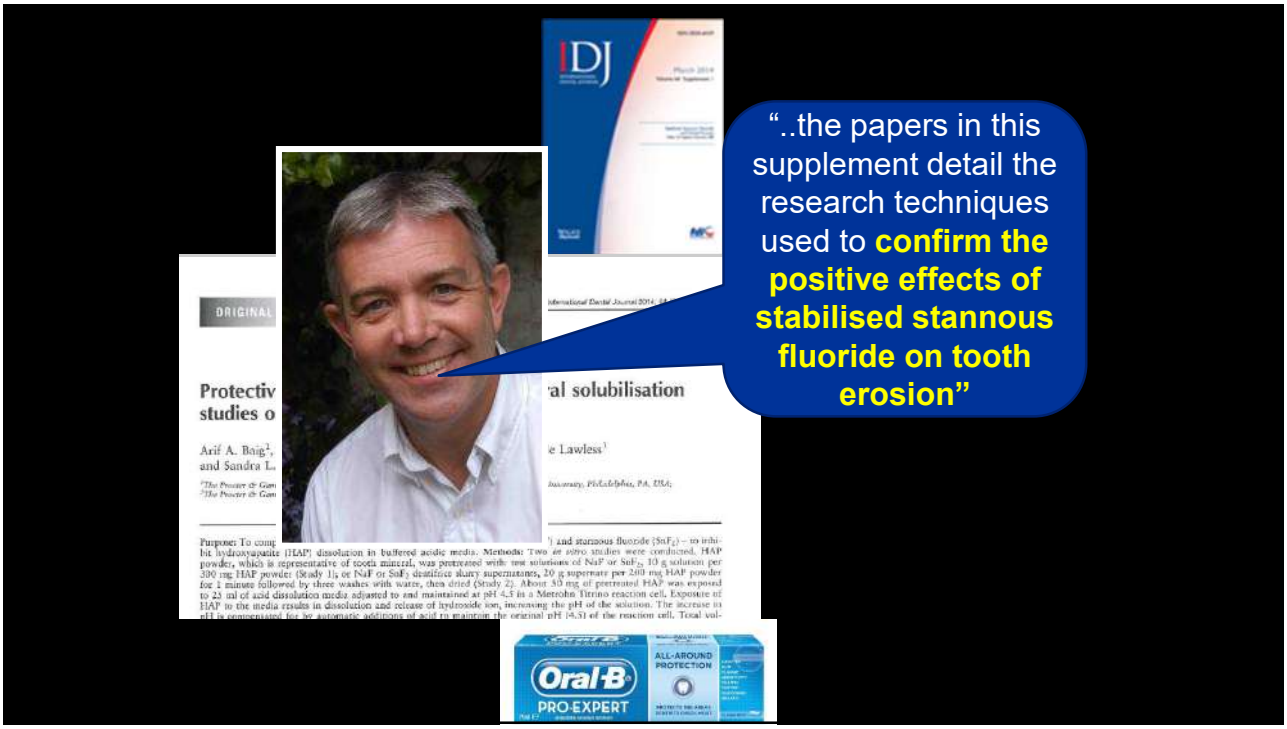

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Oxford English Dictionary Online

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"

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The 3 Ps of tooth wear treatment (Kelleher, 2011)

Preserve tooth tissue

Protect tooth tissue

Prettify it!

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Oxford English Dictionary Online

Pragmatist: Noun:

Taking a practical approach to problems

Concerned with making decisions which are useful in practice and not just in theory

Trevor's interpretation: doing the best that you can with the hand that you are dealt

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It's not perfect, it's pragmatic aesthetics!

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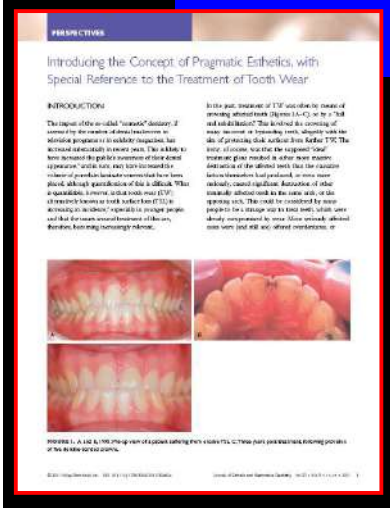
Bonding composite to worn teeth

The principle of pragmatic aesthetics



PERSPECTIVES

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

INTRODUCTION

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

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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

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.

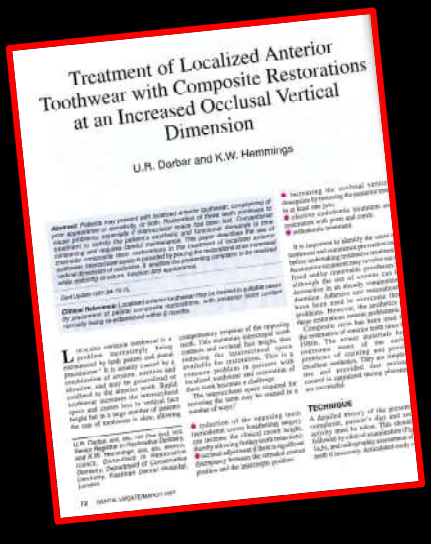
Available as a Word document on my web site

A small % of restorations debond

190

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. Durbar and K.W. Hemmings


RESTORATIVE DENTISTRY

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Using the restoration as the appliance

A case where aesthetics was not a problem

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My first “Dahl” case in 1998

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

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See Treating Tooth wear in practice Comment, Dental Update March 2021

Counselling re diet

?Crown all anterior teeth

Composite additions to worn palatal surfaces at increased OVD


Comment

Treating tooth wear in primary dental care

Patient advised of options and given PIL

194

Sure enough, after 4 weeks

Would I do anything different today?

195

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

196

9 year review

Acceptable level of maintenance

197

If treatment of tooth wear is new to you, start with a case like this

2 Class V restorations,
2 labial partial veneers
4 palatal restorations needed

198

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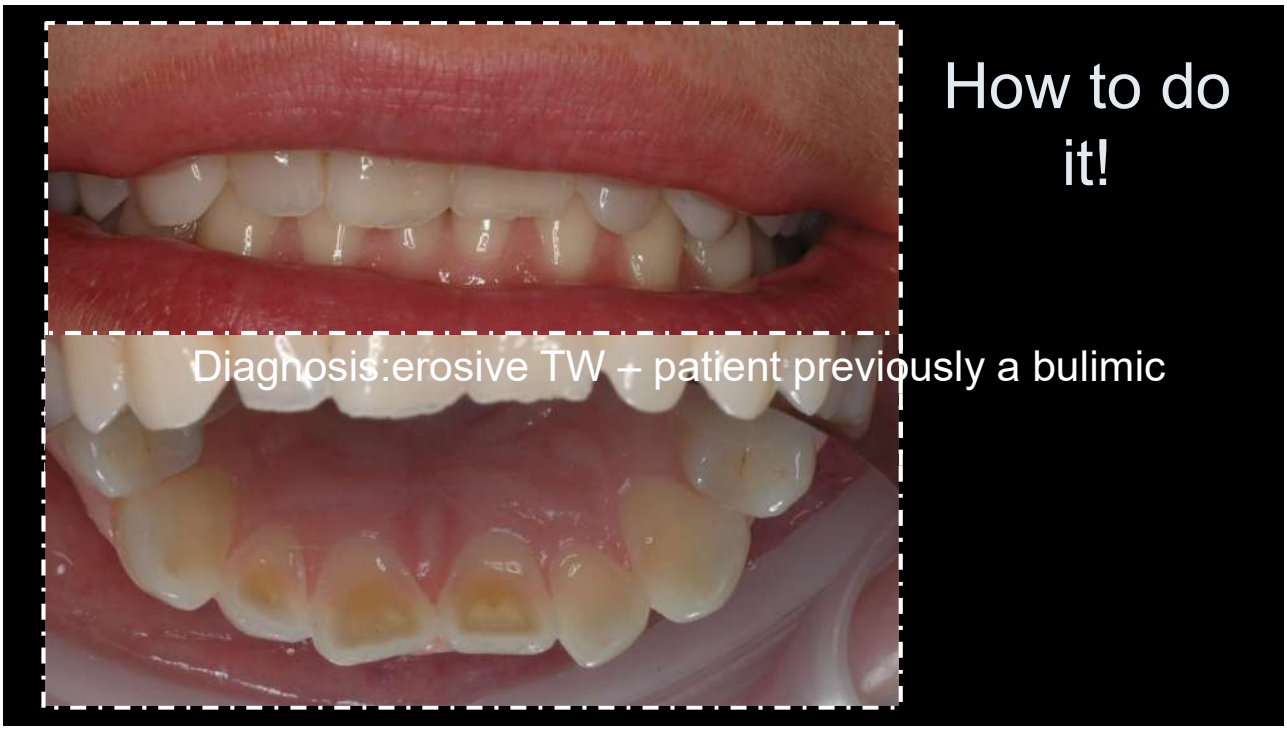

How to do it!
Diagnosis:erosive TW + patient previously a bulimic

200

How to do it!

201

Roughen the shiny surfaces prior to bonding

202

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

203

Final polish with Soflex discs (all grades except black) and Kerr Hi Luster

Mycerium Shiny paste does a good job on *pink soft* bristle brushes

204

I think that the Soflex Diamond Spiral is terrific!

205

Soflex Spirals:Use with gentle flowing motion: No pressure!!

These polish: they do not cut!

206

Isolation for tooth wear cases

207

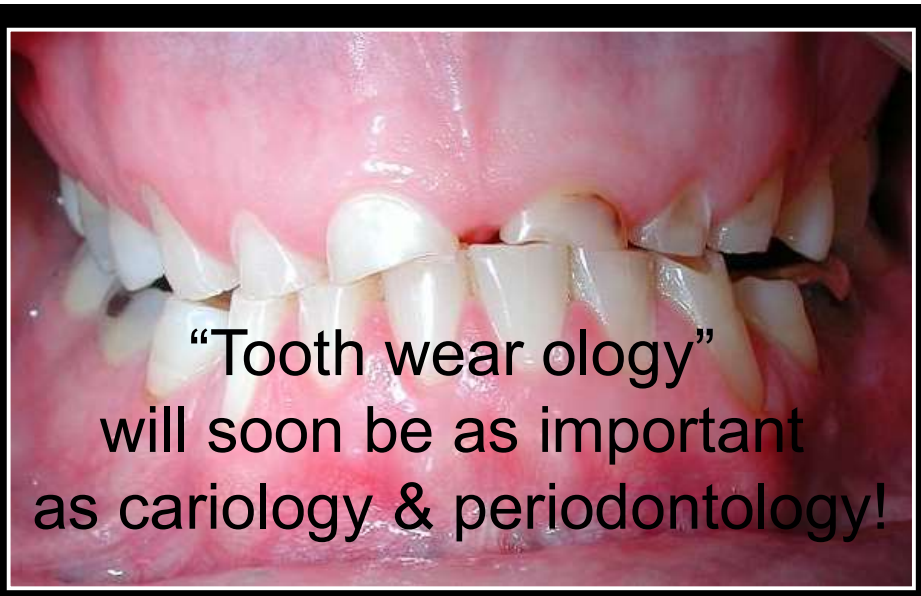
Optiview: Kerr

208

!!

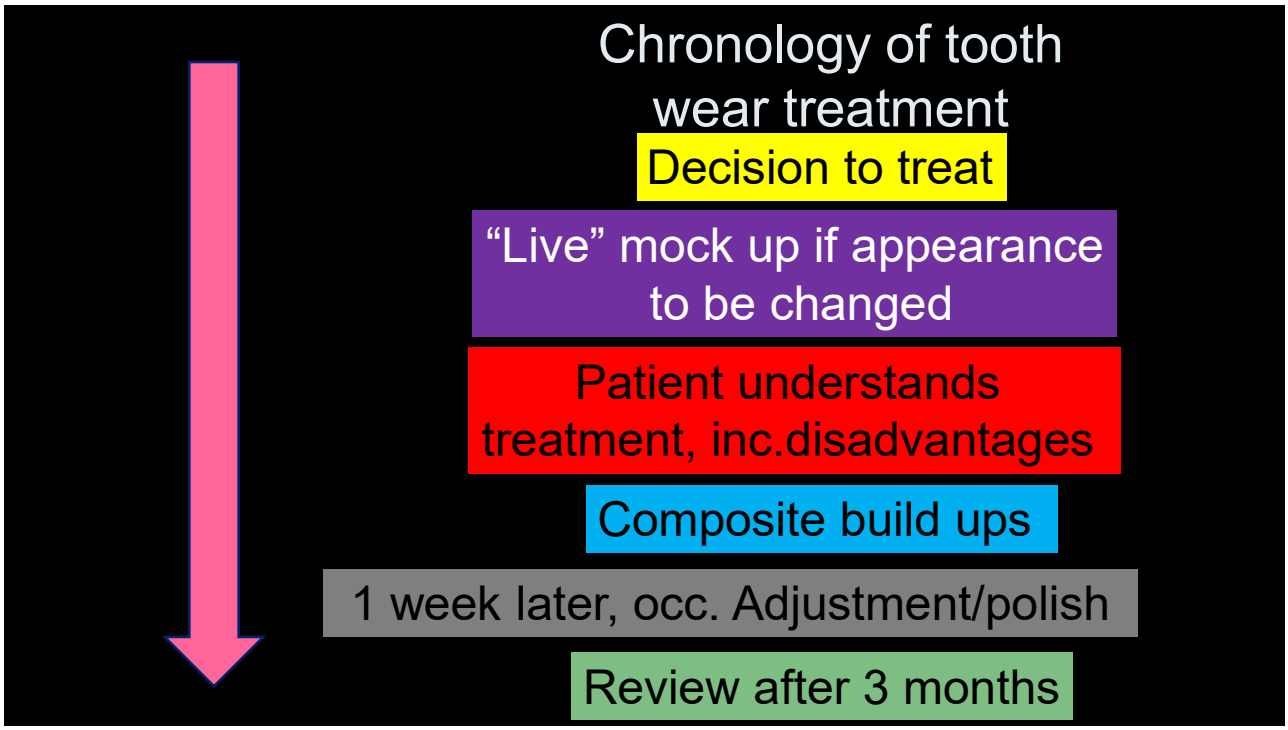
Optragate
(Ivoclar-Vivadent)

209

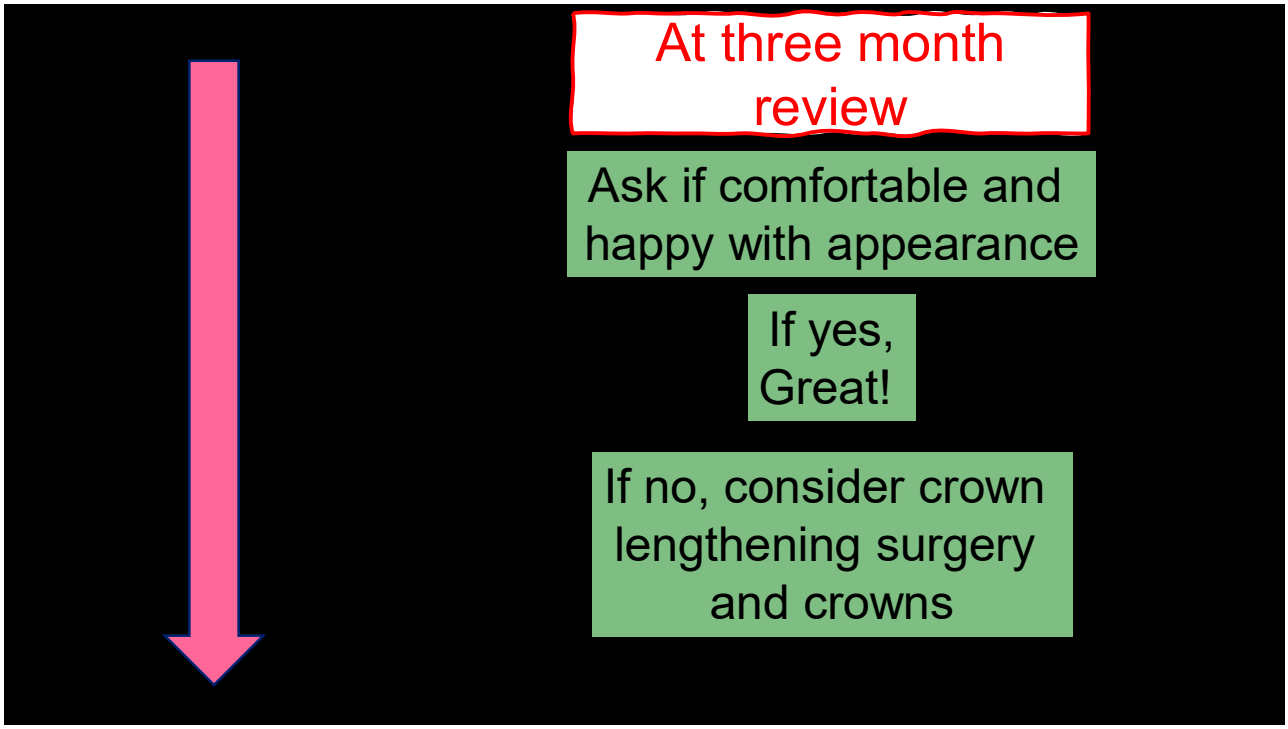


"Tooth wear ology"
will soon be as important
as cariology & periodontology!

210


Chronology of tooth wear treatment
Decision to treat
"Live" mock up if appearance to be changed
Patient understands treatment, inc.disadvantages
Composite build ups
1 week later, occ. Adjustment/polish
Review after 3 months

211


At three month review
Ask if comfortable and happy with appearance
If yes, Great!
If no, consider crown lengthening surgery and crowns

212

Choice of patient for "Dahl" technique

- Worn anterior teeth, space needed for restorations to cover dentine
- Treatment is to prevent further wear, not necessarily to improve appearance
- Capable of opening the OVD on minimum of 4 (??3) teeth
- Patient accepts short-term disadvantages
- Patient accepts that crowns may be indicated later for aesthetic reasons

213

Choice of patient for "Dahl" technique

- Patient requests treatment of wear, and/or improvement in appearance and/or function
- There are no TMJ problems
- There is ***NO*** periodontal disease/ teeth have no mobility
- OH satisfactory
- Sufficient tooth substance (enamel) for bonding

214

Information for Dahl technique patients

May cause lisping
Teeth may be painful
No posterior occlusion, so food must be cut into small pieces
Time for re-establishment of occlusion =??

215

Information for Dahl technique patients

At first visit ask patient to check restorations with tongue
Warn that will not be able to eat, chew etc
Final occlusal adjustment will be done second visit

216

Information for Dahl technique patients

For patients with bridges, warn that the bridge may not erupt into position:
Ditto implants.
The cost implications must be discussed.

217

Advice for patients with large anterior composite restorations

Restorations may need occasional refinishing and polishing
Incidence of pulp death nil
Incidence of debonding is approx 2%
Bond strength will be better in 10 years time!
Composite wears at the same rate as enamel

218

219

A big advantage!
No local!!

220

Patient Information Leaflet
Available to subscribers of Dental Update

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 should therefore cut your food into small pieces to avoid intestinal symptoms

Your back teeth will eventually erupt so that you will be able to chew on them again after 3 to 6 months

The change in shape of your upper anterior teeth might cause lisping for a few days

Your front teeth may be a little tender to bite upon for a few days

Your "bite" will feel very unusual for several days and you may find difficulty in chewing for this period, as 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 restorations may require occasional polishing

Occasionally, chipping of the restorations may occur

WORD version on my web site

221

Bonding composite to worn teeth

Do the restorations last?

222

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

Some examples…..

223

Results from published research

CONCLUSIONS from Poyser et al.

“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.”**

J.Oral Rehabil.2007:34:361-376.

224

Similar results from…

Hemmings KW, Darbar UR, Vaughan S.
Tooth wear treated with direct composite restorations at increased vertical dimension: Results at 30 months.
J.Prosthet.Dent.2000:83:28 . 7-293.

Redman CDJ, Hemming KW, Good JA. The survival and clinical performance of resin-based composite restorations used to treat localised anterior tooth wear. Br.Dent.J. 2003:194:566-572.

Gow AM., Hemmings KW. The treatment of localised anterior tooth wear with indirect Artglass restorations at increased occlusal vertical dimension. Results after 2 years.
Eur.J.Prosthodont.Rest.Dent.2002:10:101-105.

225

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]

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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

226

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

71 of the 1010 restorations failed
More failures in the lower arch, in older patients, patients with lack of posterior support and patients with class III occlusion

227

228

DISCUSSION

"Dental dam was not used, isolation with cotton rolls was adequate"

"The proportion of failures was greater in the attrition group (27.3%) was higher than in the erosion group (21.2%)"

"High load, whether in cases bruxers or cases with lack of posterior support, is likely to reduce survival"

229

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"

230

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

231

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

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Article history:
Received 18 September 2015
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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.

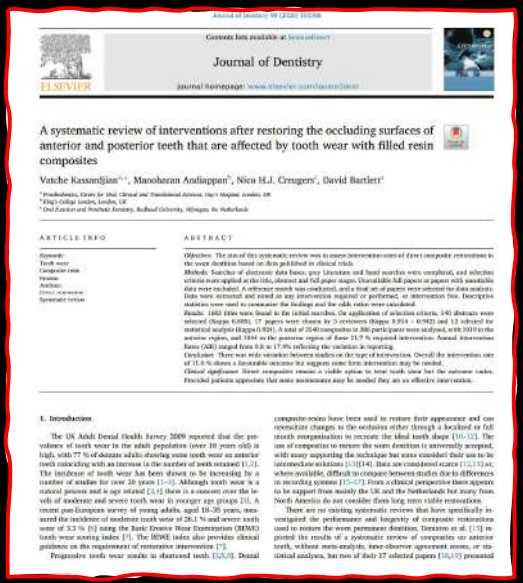
232

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.

233

The most recent systematic review



Journal of Dentistry

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, Manoharan Andiappan, Nico H.J. Creugers, David Bartlett

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.

234

Take home message

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.

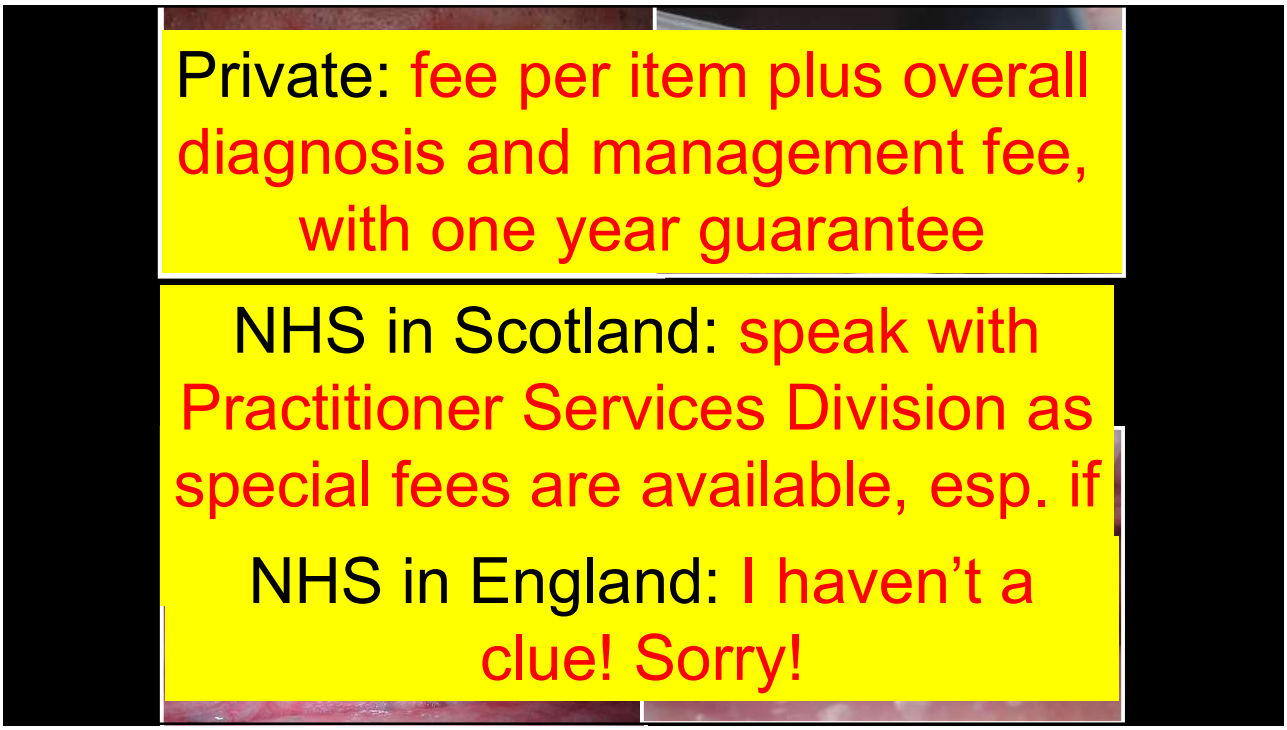
235

Final tooth wear thoughts

236

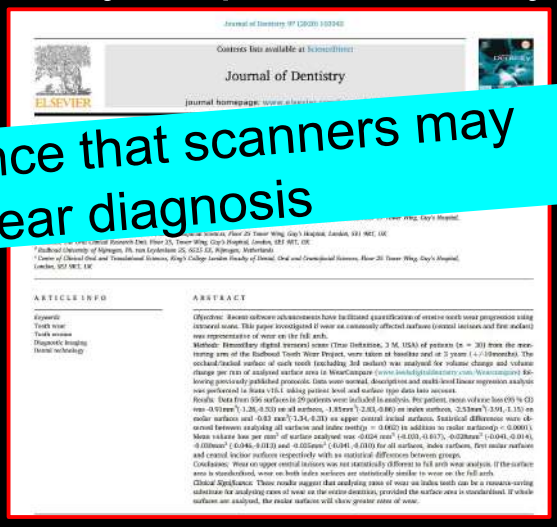

How to make TW work in your practice

237


Private: fee per item plus overall diagnosis and management fee, with one year guarantee
NHS in Scotland: speak with Practitioner Services Division as special fees are available, esp. if
NHS in England: I haven't a clue! Sorry!

238

Do you want to spend some of your pocket money?



There is increasing evidence that scanners may help with tooth wear diagnosis

Michou S, Vannahme C, Ekstrand KR, Benetti AR. Detecting early erosive tooth wear using an intraoral scanner system. J.Dent.2020:100:103445.

O'Toole S, Lau JS, Rees M, Warburton F, Loomans B, Bartlett D. Quantitative tooth wear analysis of index teeth compared to complete dentition. J.Dent.2020:97:103342.

239

We can't win them all!

240

overdentures may be appropriate when there is insufficient tooth substance available and where support is lacking

241

Might I try bonding today?

1996

242

At what stage should we treat bulimic patients?

243

Summary:
What do patients think of the "Dahl technique"?

The literature states that levels of satisfaction are high

244

TW Treatment: Clinical tips on wax up or direct placement

after Milosevic Prim Dent.J.2016:5:25-28

Make thick or wide incisal edges, particularly in edge to edge occlusions, so that guidance is flat and composite is in compression

Bevel the incisal edge (where possible)

Roughen the dentine (and etch for 30 seconds longer)

Use available labial (enamel) surfaces of the upper incisors as a ferrule to improve resistance to torqueing forces on the composite

245

TW Treatment: Clinical tips on wax up or direct placement

after Milosevic Prim Dent.J.2016:5:25-28

Warn the patient that the build ups wil be shorter than natural teeth

Keep the palatal surface guiding surfaces shallow to minimise sheer forces on the composite

Build one tooth at a time

Dental dam not always indicated as upper anterior teeth can be kept dry with cotton rolls

246

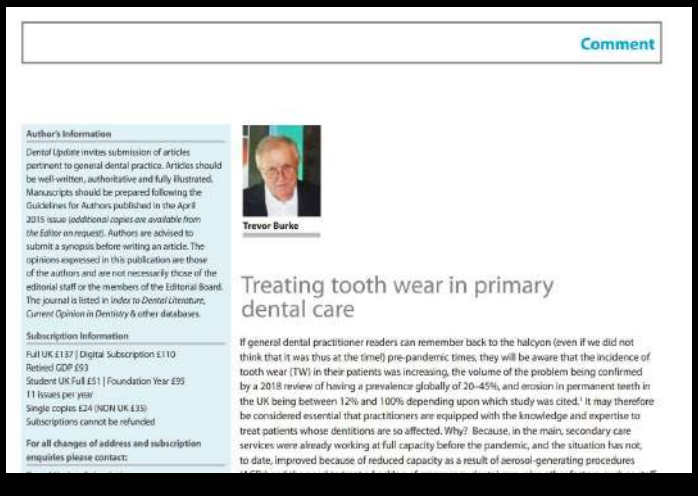
Don’t forget to ask patients about bleaching before you start the build-ups! Patients start being interested in how their teeth look!

247

Do you want to read more?

248

If treatment of tooth wear is new to you, have a look at Dental Update Comment March 2021



Comment

Author's Information

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

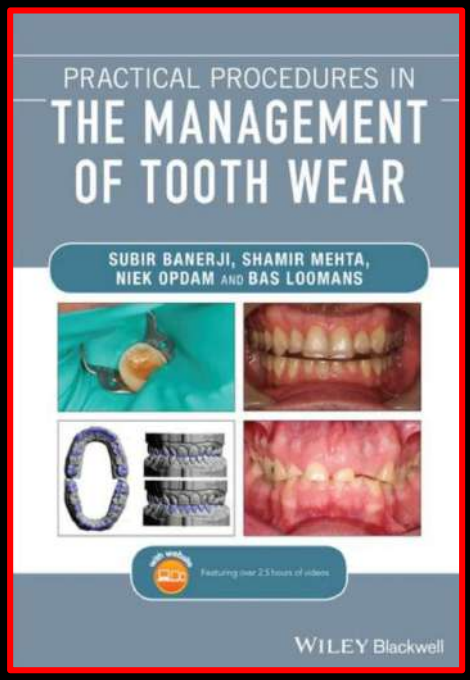
For all changes of address and subscription enquiries please contact:

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

249



For an in depth look at the subject

This book is comprehensive, very well illustrated, and easy to read

250

Conclusions from Dahl's papers

251

There is no reason to fear that modest changes in OVD should cause muscle dysfunction problems provided that the occlusion is properly managed

Dahl et al,1993


The effect of a partial bite raising splint on the occlusal face height

An x-ray cephalometric study in human adults

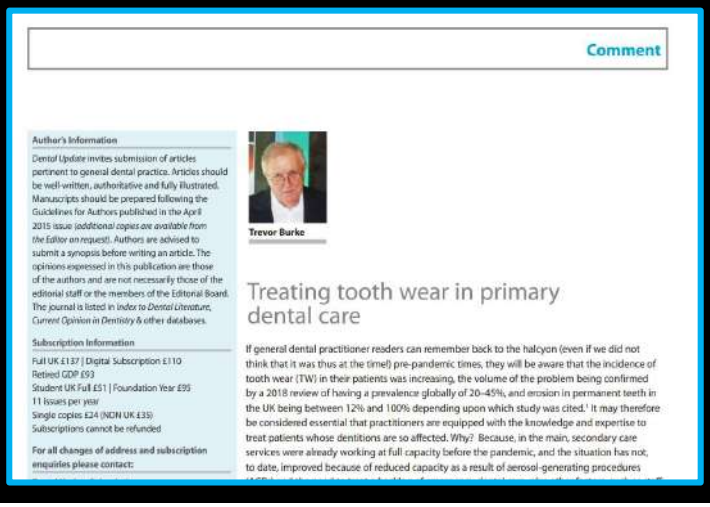
252

Clinical experience has shown that increases in OVD necessary to accommodate material thickness of 1.5 to 2mm in either jaw are well tolerated

Dahl et al,1993

253

If treatment of tooth wear is new to you, start with case described in Dental Update Comment March 2021



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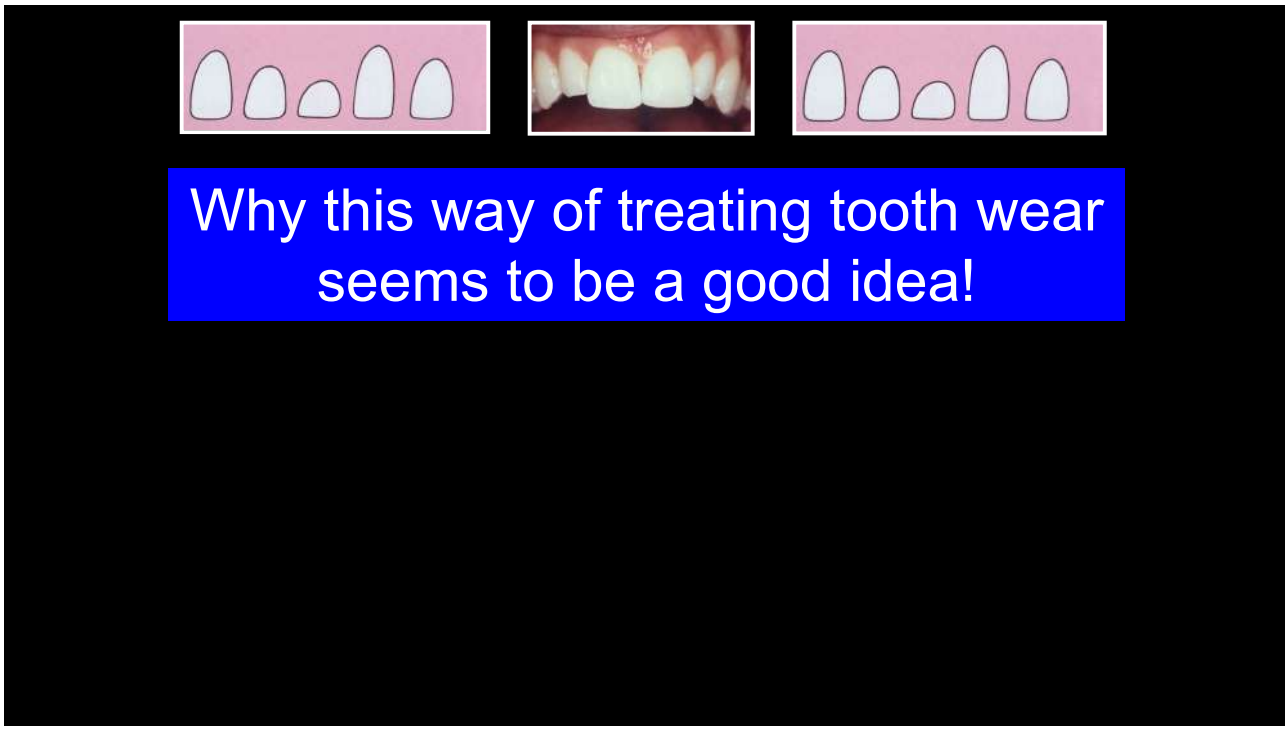
254

255



256

New dataset
10 million restorations, 16 years
Modified Kaplan Meier Statistics

Survival of the restoration
vs
Survival of the tooth

257

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

Burke FJT, Lucarotti PSK. The ultimate guide to restoration longevity in England and Wales: 9: incisor teeth: restoration time to next intervention and to extraction of the restored tooth. Br.Dent.J.2018:225: 964-975.

258

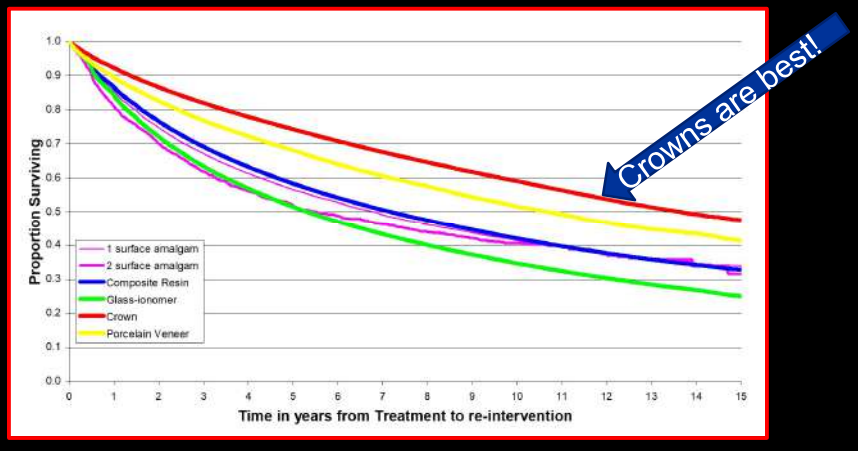
Survival to re-intervention of crowns compared with other restorations

- 3 million different patient IDs and more than 25 million courses of treatment included
- 1,203,441 teeth received crowns (880,407 metal-ceramic, 139,681 cast full or jacket crowns)
- Overall, 53% of crowns have survived at 15 years, with 63% having survived to 10 years and 77% to 5 years

259

Incisor teeth: 2,526,575 restorations:

Restoration survival to next intervention



Crowns perform best!

260

Incisor teeth: ***Survival of the restored tooth***

Explanation: When a crown fails, it fails more catastrophically than a direct placement restoration

261

Explanation!

- While crowns provide a patient with a restoration which requires the least number of re-interventions, they perform poorly (indeed, as poorly as GI) when time to extraction is examined.
- In other words, when crowns fail, they fail more catastrophically than direct placement composite restorations

262

Take home message

In general, keeping a tooth going with a direct placement filling is a a better option than reducing a tooth for a crown.
The same applies to tooth wear.

263

Clinical result from:

Milosevic Prim Dent.J.2016:5:25-28

- The secret is pragmatic aesthetics!
- Don't try to make the build ups as long as natural teeth
- The patient must be advised of this

264

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.

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

265

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

266


The best treatment is the simplest treatment that adequately meets the patient's needs
Adhesive dentistry can do this!

267


That's a pragmatic approach to treatment of tooth wear
Thank you for listening

268


It's easier to talk rubbish
than to listen to it!
Oscar Wilde, 1895

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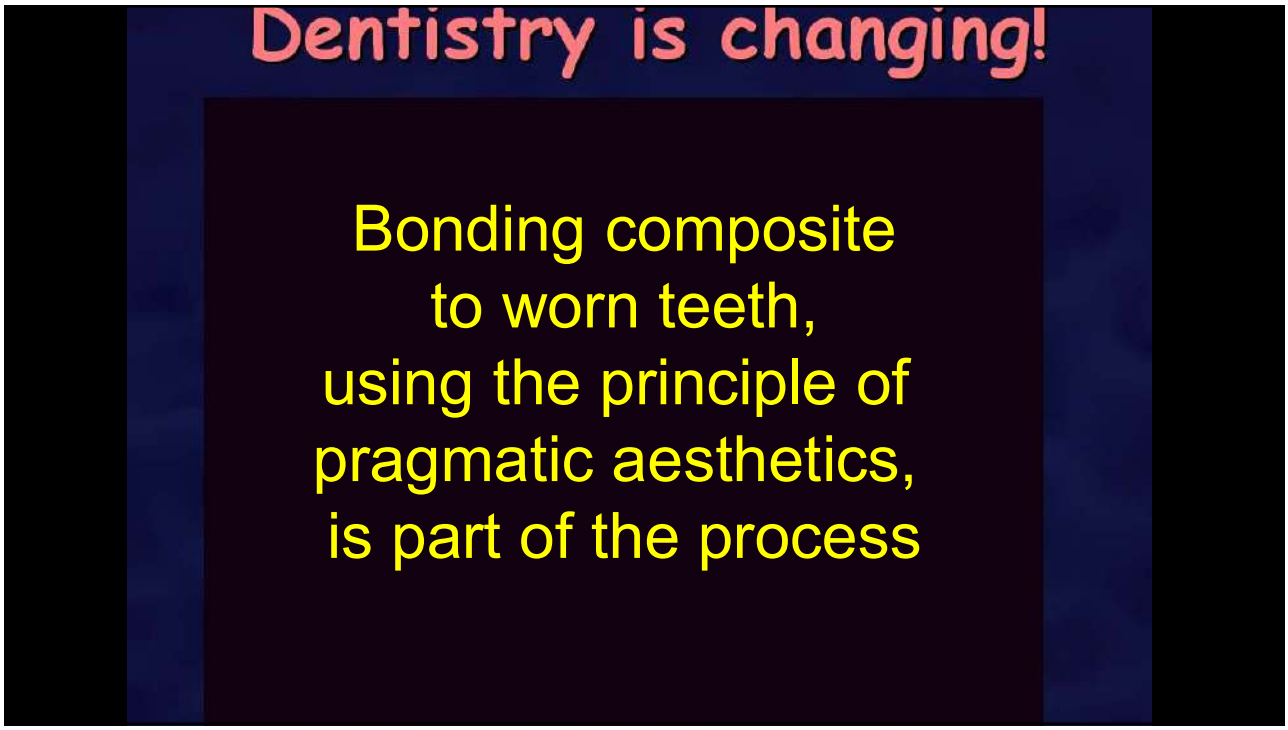
Dentistry is changing!
Bonding composite
to worn teeth,
using the principle of
pragmatic aesthetics,
is part of the process

270