













How do we get from here..



20 year-old patient High volume of sports energy drinks















Treatment of tooth wear in the dark ages!

Increasing the OVD - generalised increase by crowning all teeth













briefly...Does drilling affect teeth?

Some work on crowns

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

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





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

CONCLUSION

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

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

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%





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

procedures to provide a crown

	Update	d in 20	14 using cone beam	
ANTERIAL ADDITIC SOURNAL ADDIT		All	scans taken at Dundee Dental School over 3-year period included	
		Scans w	ans which did not include the apices of teeth excluded	
eth-inet F. Engelse WF. Statement of integration is brindly beginning to the statement of the state of the of the estate for projection of periodicate (901) only complete of periodicate	and an essential statement and (11) GeV (1^{-1} GeV) for A11 and A		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







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

employed where











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







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!!

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.

























...a landmark paper



CONCLUSION

From the results of this study, we may conclude that intraorally, 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











Universal bonding agents: new additions are on the way!

Most contain the resin 10-MDP







...a tip for optimising bonding..

69



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/H₂O and acetone based systems are vigorously rubbed on the dentine surface. On wet surfaces, light rubbing may suffice.

Rub it in!




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.



The PREP Panel evaluation of Zipbon	d
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 compute 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	





The PREP Panel evaluation of G Premio Bond















Maximising class V effectiveness

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

This study reminds dentists that they are the most important factor determining the survival of Class V restorations.
 Fresents evidence that has been collected

IN BRIEF

From a large number of resolutions placed in destral practices and is therefore likely to be particularly relevant to general practiticers. Identifier a number of factors associates with poor restrantism survival which can help dentists improve their patient care.

ESEARCH

D. Stewardson, S. Creanor, P. Thornley, T. Bigg, C. Bromage, A. Browne,* D. Cottam,7 D. Dalby,* J. Gilmour,* J. Horton, ** E. Roberts,** L Westoby¹² and T. Burke¹³

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-Meler 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



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%



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

Trevor's view:

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



Conclusion from this publication:

New Universal bonding agents are an advance in bonding

Dent.Update.2017:44:328-340

RCT: 34 patients, 152 NCCLs

Operative Dontisity; 2019, 44-5, 476-487

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

 $RF \ Zanatta \bullet TM \ Silva \bullet MALR \ Esper \bullet E \ Brescinn \ \bullet \ SEP \ Gonçalves \bullet TMF \ Comppete$

Dinical Relevance The purposition and utiliaron strategy of (invest samplified addressives usay he next as constructions correctly below, with principal dentity schemetric.

SUMMARY

Dijectives: This study aimed to evaluate the nonling performance of a universal adhesive used according to self-teleting or utele-andfing portocols in noncriticus covidal lesions (NCCLs) and (a compare the two protocols with their respective gold standard techsiques.

Mothods and Materialist This examination in the disholding different study environment of a portion transferrence Zimits. DOS, NS, Phil, association involution transferrence Zimits. DOS, NS, Phil, association in the strength of the strength of the strength of the transferrence of Simon 1940. Spectra of the involution of Simon 1940. Spectra of the Simon 1940. Spectra of the Bostownice Benings, testicate of the same and Technology, the basis has the Universe T- USBS Spectra of the Simon in Simon 1940. Spectra of the same and the Simon 1940. Spectra of the Simon 1

damido Brascami, 1006, MSr. 1900, accession produm Reperiment of Bestantillos Rossburg, Instituto of Storant Technology, Son Plaid State Doversity - UNESP, S notes who met the inclusion criteria, 29 d rhom exturnal differ two years. They receive all vertextions boundly with one of the thre thosives. (Scotchland Universal Adhead dury Single Bound & ver Userfill SE hern ni one of the two isoaling techniques itself hern VLL a were received with monocomparinet of the two isoaling techniques in the hern VLL a were received with monocomparinet of the two isoaling techniques in the hern VLL a were received with monocomparities with a fixe distance of origin, instances and polished with rabber points. The restorment were eviduated using the D1 Word fractions the theory bounded to and Theory fractions the theory bounded to and the fixed fractions the theory bounded to and Theory fractions the theory bounded to and the theory for the theory bounded to and the theory fractions the theory bounded to and the theory for the theory of the theory of the theory for the theory of the theory of the theory for the theory of the theory of the theory of the theory for the theory of the theory of the theory of the theory of the theory for

That Deserting - United vision and the company and transforming on the second sec Bonded with SB Universal, Adper Single Bond, Clearfil SE





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

18 pages!!

Shear bond strength tests

Bonding Performance of Universal Adhesives: An Updated Systematic Review and Meta-Analysis Catos Engus Cleves Summer / Weingan Lut & Univer as Roser / Refee Clevers Lind ? Adhesi Fernandes as Shire / Second Pres

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9284 publications, 81 read in full, 57 reviewed



What is the cost of one failed adhesive restoration?

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

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!



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



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

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

DANERS H. WARD, DOL

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

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

previously reported to occur in the cortin synerican population. Materials and Reflotter: Three hundrefs and one North Aurencian dentists were surveyed to lettermine their prehenences of imaged smilles exhibiting different anterior toorb width proportions and the primary proportion inflatencing their decision. One-sample retark were used to compare preferences of constructed units. Persons's Chi-square test was used in sources the independence of the relationship between this subjects' demographic articluses and the factors reported as being instrumental in their decision processes.

reported as being instrumental in their decision processes. Results: Fully seven percent of domists surveyed preferred the smiles with the 70% RED proportions in non-wort he smalles with the naturally occurring maxillary antenue nooth width proportions in normal length teeth. Dentata preferred the smiles of the naturally occurring maxillary rooth proportions 10%) and the 70% RED proportion (75%) over the golder proportion. In smiles with all teeth, the golden proportion was preferred by 58% of the surveyed dentities over the naturally occurring nooth-to-rooth width proportions as previously defined by Persion. Sixty-noo percent of definition circled the versal balance at the primacy factor attream that selection. Twenty-there percent made their selection based on the size of the maxillary central incissues, whereas 15% used other teeth on factors. Survey of 301 North American dentists to determine preferences of anterior tooth width proportions

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

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



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

ly is reduced by with an 80% RED propartion refrom its mesial when viewing very short reeth, the this since percentage from its mean rooth. The $^{-0.0}a$ RED proportion width central and lateral incisurs smile with the central incisor correhas been recommended for normal-length teeth with a 78% width/ viewing normal-length teeth, and with short teeth. When applying the principles of the RED proportion, lace teer recommender for normal spring of the '0''s RED when the manufacture of the RED proper-beight ratio of the maxillary central the wind with the golden proper the raller the neeth, the smaller increases (Figure 3). When using the 'o'''s RED when viewing very RED proportion used, and the the raller the nech, the smaller the Gulden Proportion 0.7x 0.19x x **RED** Proportion 70% RED Proportion (70% for normal length teeth) 78% w/h ratio Engine 5: Graphic representation of air normal-longit-maniflary anterior well using the recommended Tes-rearring enthers. dentet (KED) proportion. Figure 4. Graphic representation of different length maxi-lars autorios tools maintaining a 78% widdtshreight with ratio of the central manney.

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

Conclusion

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

Trevor's conclusion

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









Length to width ratios

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

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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

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Sterrett JD clinical crow in man. J.C RESULT	et al. Width/l vns of the ma lin.Periodont S: Mean w	ength ratios axillary anter ol.1999:26:1 idth/length	of normal ior dentition 53-157 ratios,
standarc	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

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







Width to length ratios:

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

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



- 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,









Pathogenesis of erosive tooth wear

ACID + TEETH minus PROTECTIVE EFFECTS

Demineralisation

Demineralisation occurs at a pH of less than 5

Citric Acid

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







Name of drink	pH	
Lemon juice	2.25	
Ocean spray Cranberry	2.56	The pH of beverages in the
Barber's orange juice	3.61	Avanija Reddy, DMD, MPIC Don F. Norris, DMD; Stephane S. Moneni, MS, MBA; Belinda Waldo, DMD; John D. Ruby, DMD: PMD
Minute Maid Natural Energy Mango	3.34	a function of the second and flavored beyong consumption in successed dramatically over the your y years in successed dramatically over the your y years in the transformation of the second dramatical second
Juicy juice apple	3.64	In the curve same where converted and diffuse office by column a sugger pri-1 register the signal pri-different column and prior pri-1 register the signal p
Tropicana grape juice	3.29	administ no-shufe almost anny. Between upga and almo, daily cardonated almost of thread administ of the strength of the streng
Simply lemonade	2.61	The authors purchased 379
Coca Cola Zero	2.96	stores in Birmingham, Alabama.
Coca Cola Classic	2.37	93% had a pH of less than 4.0
Coca Cola Cherry	2.38	Ruby JD The pH of beverages in the United States.
Pepsi	2.39	
Pepsi Max	2.74	. AND a set start and the set of

Brief conclusion: drinks may be a major cause of erosion

Terrent and a second seco	A.		Journal of Dentistry
The relationship between enamel softening and erosion caused by soft drinks at a range of temperatures M.S. Barbaur ^{4, A.} , M., Finke ⁶ , D.M., Parker ⁶ , J.A., Hughes ⁶ , G.C. Allen ⁶ , M. Addy ¹⁰ Particular of the ard barbs former, <i>lowering of the 10, herseit, and th</i>	ELSEVIER	1004	an a southant conjugation
Of temperatures Statistical interview An interview	The relatio and erosior	nship between enamel so caused by soft drinks at	oftening a range
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RECEVORES sertime inflation: which is a set of the	Received 50 March 2015. a	anipint & Jaw 2001	
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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 and networks. Atomic force microscopy nanoindentation and non-contact optical

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 noncarbonated soft drinks at 4, 25, 50 and 75 °C, Results: For one drink (Robinson's Original ~ Juice Drink), there was a statistically

Kesuffs: For one drink (Robinson's Original – Juce 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 ToothKind¹⁹ Julce 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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Problems with tea too!

Austral of Section (120): 147, 36-348 Australia Section (12 www.consectionStreet.com Because Canaces and Canaces

The erosive potential of some herbal teas

857 2LY, UK	Liquid	pH	Neutralisable acidity (ml)	Enamel erosion (µm
read 26 Petersary 2003: accepted 28				
Summary Objectives. Many	Tesco blend ^a	5.67 (0.08)	3.54 (0.46)	0.06 (0.10)
the contamption of herbal t	Lift instant lemon tea	3.78 (0.06)	31.14 (2.74)	3.75 (0.07)
th surface too, Ten. In other beverages, the arrivation real ins their generatian to cause ero Mericor. The service too	Echinacea and raspberry	3.49 (0.04)	13.42 (2.21)	3.61 (0.07)
inforatory by measuring di enamel and these were con-	Blackcurrant, ginseng and vanilla	3.45 (0.05)	14.86 (1.46)	5.09 (0.08)
Results. The phi of the t activity ranged from 3.5 to	Raspberry, cranberry and elderflower	3.15 (0.08)	23.36 (1.89)	8.99 (0.20)
following 1 h interension in 2 the mange juice control had	Raspberry, strawberry and loganberry	3.18 (0.03)	20.04 (1.39)	9.11 (0.10)
Ecochaston, Many of the stratege taker. This informat	Camomile	7.08 (0.12)	Unable to measure	Unable to measure
with facth surface lass d 2000 Exercise Science Ltd	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)
e to a chemical process	Orange juice	3.73 (0.05)	21.4 (0.09)	3.3 (0.90)
by other extrinsic or				
nacia ar environmental	* Tesco Stores Ltd, Tesco House, Cheshunt	, Waltham Cross, Herth	fordshire, EN8 9SL, UK.	
nt voiniting as part of				
the requiring tables of the	a contract in some danks, on these days			
	BS 21/V (K and 26 Pressure 3200) accesses ID Thermony Objectives , deep the consumption of the second the construction of the second the construction of the second the construction of the second the construction of the second the second the second of the the second the second of the the second the second of the the second of the second of the second of the second	Britz (# Liquid Liqu	BS:127, IX Liquid pH Serverse 30% exercises Liquid pH Serverse 30% exercises Tesco blend ^a 5.67 (0.08) Serverse 30% exercises Lift instant lemon tea 3.78 (0.06) Marks: The relation back Lift instant lemon tea 3.78 (0.06) Marks: The relation back Lift instant lemon tea 3.78 (0.06) Marks: The relation back Blackcurrant, ginseng and vanilla 3.45 (0.05) Arast: The relation back Raspberry, cranberry and elderflower 3.15 (0.08) Controls May of there are back in the relation back in the relating back in the relating back in th	Bit JLY, R Liquid pH Neutralisable acidity (ml) Strange diverge. Ref Strange diverge. Ref 5,67 (0.08) 3.54 (0.46) Strange diverge. Ref Lift instant lemon tea 3.78 (0.06) 31.14 (2.74) Strange diverge. Ref Echinacea and raspberry 3.49 (0.04) 13.42 (2.21) Market. Ref diverge. Ref Blackcurrant, ginseng and vanilla 3.45 (0.05) 14.86 (1.46) Arati. Ref diverge. Ref Raspberry, cranberry and elderflower 3.15 (0.08) 23.36 (1.89) Control Ref 7.08 (0.12) Unable to measure Control Ref 7.08 (0.12) Unable to measure Control Ref 3.25 (0.04) 15.96 (1.51) Lipton ice lemon tea 3.26 (0.05) 60.3 (1.99) Vertice Ref 3.73 (0.05) 21.4 (0.09) We diverge in an dref 3.73 (0.05) 21.4 (0.09) We diverge in an dref 3.73 (0.05) 21.4 (0.09) We diverge in an dref 3.73 (0.05) 21.4 (0.09) We diverge in an dref 3.73 (0.05) 21.4 (0.09) We diverge in an dref 3.73 (0.05) 21.4 (0.09) We diverge in an dref 3.73 (0.0

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	pН	Neutralisable acidity (mls)	Enamel erosion (microns)
Lucozade [™] sport orange	3.34 (0.05)	12.57(1.21)	4.18 (0.70)
Lucozade TM 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)

a positive control, unarge puce and a negative control, active, the per of two sports armies ranged from 5.10– 3.70 with their neutralisable acidity ranging from 9.74–13.44 mls of 0.1M NaOH The amount of enamel removed following 1-bour immersion in the sports drinks ranged from 1.18–5.36 microns. In comparison, the orange juice control bad 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 evolve. 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.

ental crossen is defined as a superficial loss of tooth substance by a chemical process that does not involve bacteria.¹⁴ The resulting chemical etching usually reflects the effect of Background. Detail remains can read from numerous causes, but architect detail forthers are the most common. Because of words audidy, it may have a deleterous effect on teeth. The use must be considered during an evaluation of evolve destal channes.

Case Description. (In spore case, line) a folyaryod suman because interreferring dontast had noted attentive area ave ions of soch structure, mainly enzuel. The sature eliminated the sumal crusses of dental enzion. It was only after a detailed betwey was obtained and denta provides inter was undertaken but the suffer detemined that the sumsont, manner and think of the patients' wine defining was the use

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

inappropriate use of wine can lead to actensive reported an dental thermore, erosions, the prolon

has been respected to range from 5.0 to $1.8_{\pm}^{-0.-0}$ with white wine hours sliphtly more applied than red wine.¹⁻⁰ Wine derives its avoid y mostly from its contained last arg and make acids and from smaller consentrations of other and southle consentrations of other and southle which segmed smalters is









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

There may also be other health hazards







Tooth wear – brief revision time!




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.



Other causes of erosion: medicinal causes

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















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









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)

Soft tissue physiology

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

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











Should we use a putty matrix?

Yes, if the composite slumps and cannot be used freehand



...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 Physiological Laboratory, Guy's Hospital Medical School, London Bridge, London S.E.1

net—In five human subjects, the occlasal surface of the right lower first permanent r was raised by means of a removable metal cap approximately 0.5 mm thick, we case the cap was an anatomical replica of the occlassi surface of the chosen and was worn continuously without disconfort for 23-41 days. Immediately either the subject was were unable to make contact anywhere with the eitherhold excerpt be subject was enable to make contact anywhere with the eitherhold excerpt be subject was an examinate the contact anywhere with the dwhole-arch centric occlusal contact became possible, and measurements between mere points on the capped tooth and antagonist and between other pairs of teeth that adjustments in tooth position took place.

INTRODUCTION

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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

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

Dahl Appliance

Eruption Intrusion Intrusion/eruption

60% of cases 35% of cases 5% of cases

The first case report

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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.

"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". 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".

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".

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

An x-ray cephalometric study in human adults

IDDRN L UARD & DEAF KRUDSTAU

Departments of Privatestic Dentistry and Onfordramos, Dono) fu-culty University of Oslay Oslay Network Dabi, B.L. & Kregatad, O. The offset of a partial but unship optimizin the output fine height. An Assis combificientia: kody in human shilts. *Franklingtok Scientel* 1082–80, 17 – 54.

Addition, Find gradientito & Social (2012, 40, 177-34). The presence (14) a Structure were presented interaction and appreciated by trademistic and the presented of the structure of the structure of the structure and the structure Key woods. Or al reladablications arrenting retrastion and exactling

Been I. Hold, Department of Brochene Descripty Donal Faculty. Hot 1999 Mandem (Eds.), Margaret

The work of Thumpson (19) on the rest position of the mandible served for many years as a base for the under-standing of the scritcal dimensions of the face. Permanent alterations in the occlusal face height have been warned against (8), It has been demonstrated base the postural face height ulters as a response to alterations in the tooth wear's often observed of tracking ulters as a response to alterations in the tooth warn's often observed of tracking ulters as a response to alterations in the toweter, that the postural face height ulter as a response to alterations in the tooth warn's often observed of tracking under foods as a response to alterations in the tooth warn's often observed of tracking ulter as a response to alterations in the tooth warn's often observed of tracking under sources using a partial bite raising of tradment could be regarded as an eventment to study the balance of for-cess influencing the versual dimensions of the tace.

Provide the relation of the state of the state

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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.

...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









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"









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 should therefore cut your food into small pieces to avoid intestingly symptoms Your back teeth, min eventually erupt so that you will be able to have an event will be able to chew on your back teeth for a period of 3 to 6 months, and you should therefore The change in short back and the principal reason and the principal rest of th	Burke FJT. Information for Patients Undergoing
Your TALE AND AND REAL ATTERNET TO DITE UPON FOR a four days Your bite will feel very anosociation 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.	Restorations Placed at an Increased Occlusal Vertical
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.	Dimension. Dent. Update 2014:41:28-38.
Occasionally, chipping of the Atomic Materia Constrained polishing	





My first "Dahl" case in 1998



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



Patient advised of options and given PIL

Sure enough, after 4 weeks



different today?

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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











How to do it!





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





I think that the Soflex Diamond Spiral is terrific!



Isolation for tooth wear cases



















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 =??

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
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.

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 ename!



A big advantage! No local!!

Patient Information Leaflet Available to subscribers of Dental Update

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

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 eruper activity you will be able to chew on them again after 3 to 6 months The change in scheme of your upper activity to that you will be able to a term days

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





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.





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





"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"

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"





Best treatment for worn teeth?

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

The most recent systematic review



- 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.

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.









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Detecting early erosive tooth wear using a There is income	reasing evide	nce tha vear dia	t scanners may gnosis ware and the second state of the second stat
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overdentures may be appropriate when there is insufficient tooth substance available and where support is lacking



At what stage should we treat bulimic patients?

Suggestion: Before the enamel is lost



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

The literature states that levels of satisfaction are high

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



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



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



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For an in depth look at the subject

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

Conclusions from Dahl's papers

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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



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









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.











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.

Clinical result from: Milosevic Prim Dent.J.2016:5:25-28



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









