Life after Minamata

Disclosures

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

"Some manufacturers fund research that I carry out"

“I am not anti-amalgam (really!)”

“I am in favour of minimally invasive dentistry”

I am also one of the heavy metal brigade, so am interested in longevity of amalgam restorations!

Take home message

Nothing lasts forever:
Size matters – big fillings last less well than small

Take home message

Keeping cavities as small as possible is therefore important

It is not possible to do that with amalgam!

AMALGAM

Environmental concerns……..YES

Toxicity issues…….. NO

Slide made in 1996

Diplomatic Conference for the Minamata Convention on Mercury

- Chemical company started in 1908 (Chisso Co.)
- In 1932 they started making acetaldehyde, used with other chemicals to make plastics, Hg used as catalyst
- Organic Hg dumped into the ocean
- Locals ate the fish and shellfish
- Cats started going crazy: humans had difficulty walking, talking, eating, had convulsions and died
- Resultant mercury poisoning affected 60,000 people, first reported in 1956
- One of the world's worst environmental disasters

Diplomatic Conference for the Minamata Convention on Mercury

- Ministry of Trade & Industry blocked researchers from getting access to company waste
- Eventually made the company install a cyclator (sedimentation system)
- 1959, agreement with patients of Minamata disease to give sympathy money in return for promising not to sue
- 1968, the Government officially announced the cause
- 1973, Chisso Co. lost a lawsuit, largest settlement in Japan at that time

Diplomatic Conference for the Minamata Convention on Mercury

Annex A, Part II; Measures to be taken to phase down the use of dental amalgam

- Set national objectives for caries prevention
- Set national objectives aimed at minimising amalgam use
- Promote use of cost-effective and clinically effective mercury-free alternatives
- Promote R&D into quality mercuryfree materials

Diplomatic Conference for the Minamata Convention on Mercury

Annex A, Part II; Measures to be taken to phase down the use of dental amalgam

- Encourage professional organisations and dental schools to train dental professionals and students in the use of mercury-free alternatives
- Discourage insurance programmes that favour dental amalgam use, and encourage insurance programmes that favour use of alternatives
- Restrict use of amalgam to capsulated form
- Promote best environmental practices in dental facilities to reduce releases of mercury

The Minamata Convention

Final agreement, 10th & 11th October 2013, 147 countries signed up

Treaty is “expected to come into force in 2 to 3 years”

“Worldwide reduction and ultimate ban on mercury containing products”

Authors' Information

Dental Update invites submission of articles pertinent to general dental practice. Articles should be well-written, authoritative and fully illustrated. Manuscripts should be prepared following the Guidelines for Authors published in the April 2005 issue *(additional copies are available from the Editor on request)*. Authors are advised to submit a synopsis before writing an article. The opinions expressed in this publication are those of the authors and are not necessarily those of the editorial staff or the members of the Editorial Board. The journal is listed in *Index to Dental Literature, Current Opinion in Dentistry, MEDLINE* & other databases.

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Trevor Burke

Minamata four years on

Readers will be aware that The Minamata Convention on Mercury is a global treaty, signed by the UK and over one hundred countries from all over the world in October 2013, with the intention of protecting human health and the environment from the adverse effects of mercury, for example, by limiting the use of mercury from all sources, including LED light bulbs, fluorescent tubes, fertilizers, thermometers and, of course, dental amalgam. The agreement indicated that the mercury limitation would commence within four years, and Annex A part II dealt specifically with dentistry. Four years on, it might be considered useful to reflect how far along that road we have gone, given that we agreed to '*Promote use of cost-effective and clinically effective mercury-free alternatives*'.

At the time of writing, the Convention has been signed by 128 countries and ratified by 71, with Jamaica being the most recent country to '*deposit the instrument of ratification*'. The arrangements sealed within the Convention were that it would enter into force on 15 August 2017 in the ratifying countries, that being 90 days after the fiftieth ratification was received.[1] Regulation (EU) 2017/852 of the European Parliament was agreed on 17 May this year, the implication of this being that, from 1 July 2018, dental amalgam '*shall not be used for dental treatment of deciduous teeth, of children under the age of 15 years and for pregnant or nursing women, except when deemed strictly necessary by the dental practitioner, based on the specific medical needs of the patient*'. I cannot think of anything falling into that category, with the exception of allergy to a constituent of an alternative

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specific retention level of 95% of amalgam particles. Chuck Palenik's article on this subject in the current issue helps shed some light on the situation in the US.

Despite all of this, the European Parliament voted, earlier this year, in favour of a gradual phase down in dental amalgam use rather than the total ban which was rumoured to be made in 2022. Indeed, a British Dental Association press release in May 2017 proudly announced that they had campaigned against a ban on amalgam and that the phase out of amalgam was unlikely to take place until 2030. Apart from the mercury argument, this ignores the benefits of using an adhesive material such as resin composite – one being less invasive cavities, which are less likely to result in fracture of posterior teeth, and apart from the fact that patients appear to prefer tooth-coloured restorations in their back teeth. Furthermore, results of a survey of the views of a convenience sample of 249 regularly attending dental patients in relation to the materials used in their teeth, indicated that 31% had anxieties about use of amalgam in their mouth and provoked anti-amalgam comments from 66 respondents, principally those who had worries regarding amalgams on health grounds:[2] even I was astounded by their depth of feeling!

I can understand the Department of Health in the UK being anxious about having to fund an alternative to dental amalgam, given that restorations in the main alternative, resin composite, were estimated to take 2.5 times longer to place than amalgam.[3] However, those data were published a long time ago, and it could be that

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Norway did it!

How?

1991, Directorate to reduce amalgam use
2003, National clinical guidelines - encouragement to reduce amalgam use. Amalgam no longer the material of choice for posterior teeth, informed consent needed from the patient if amalgam used
2007, Restrictions on mercury vapour emissions from crematoria
2008, Partial ban on amalgam use
2011, Complete ban, although dentists can apply for exemptions

Lynch CD, Wilson NHF. Br.Dent.J.2013:215:159-162

Amalgam has had a turbulent history

Amalgam – resurrection and redemption. Part 2.
Michael J Wahl.
Quintessence Int.2001:32:696-710.

The scientific evidence (170 references):
Does not support the myth that mercury from dental amalgam causes kidney damage
Does not support the myth that dental amalgam is associated with MS, Alzheimer's Disease, mental disease or "amalgam illness"
Does not support the myth that mercury from dental amalgam damages the immune system or causes harmful reproductive effects

Bellinger DC et al. Neurophsychological and renal effects of dental amalgam in children. JAMA. 2006:205:1775-1783

If it's OK in children…….

Take home message: There is no evidence of mercury toxicity for patients

? evidence
of mercury
toxicity for dentists

What was I about to say?

IN BRIEF

- One hundred and eighty dental surgeries were tested for environmental mercury.
- Sixty eight per cent had environmental mercury readings over the occupational exposure standard.
- Greater emphasis is needed in the safe handling of mercury.
- Dentists were more likely to have suffered a kidney disorder than the control group.

Mercury vapour levels in dental practices and body mercury levels of dentists and controls

K. A. Ritchie,[1] F. J. T. Burke,[2] W. H. Gilmour,[3] E. B. Macdonald,[4] I. M. Dale,[5] R. M. Hamilton,[6] D. A. McGowan,[7] V. Binnie,[8] D. Collington[9] and R. Hammersley[10]

Aim A study of 180 dentists in the West of Scotland was conducted to determine their exposure to mercury during the course of their work and the effects on their health and cognitive function.

Design Data were obtained from questionnaires distributed to dentists and by visiting their surgeries to take measurements of environmental mercury.

Methods Dentists were asked to complete a questionnaire including items on handling of amalgam, symptoms experienced, diet and possible influences on psychomotor function such as levels of stress and alcohol intake. They also completed the 12-item General Health Questionnaire. Dentists were asked to complete a dental chart of their own mouths and to give samples of urine, hair and nails for mercury analysis. The dentists were visited at their surgeries where environmental measurements were made in eight areas of the surgery and they undertook a computerised package of psychomotor tests. One hundred and eighty control subjects underwent a similar procedure, completing a questionnaire, having their amalgam surfaces counted, giving urine, hair and nail samples and undergoing the psychomotor test procedure.

significantly associated with their level of mercury exposure as measured in urine. One hundred and twenty two (67.8%) of the 180 surgeries visited had environmental mercury measurements in one or more areas above the Occupational Exposure Standard (OES) set by the Health and Safety Executive. In the majority of these surgeries the high levels of mercury were found at the skirting and around the base of the dental chair. In 45 surgeries (25%) the personal dosimetry measurement (ie in the breathing zone of dental staff) was above the OES.

Conclusion On the basis of these findings, it is recommended that greater emphasis should be made relating to safe handling of amalgam in the training and continuing professional development of dentists, that further studies are carried out on levels of mercury exposure of dental team members during the course of their working day, and that periodic health surveillance, including urinary mercury monitoring, of dental personnel should be conducted to identify possible effects of practising dentistry.

- 122 surgeries had mercury levels higher than the Occupational Exposure Standard
- In 45 surgeries the personal dosimeter measurement was above the OES
- Dentists were 4 times more likely to have kidney disease
- Urinary mercury levels of dentists were 4 times greater than controls
- Dentists' reported short-term memory worse than controls

CONCLUSIONS

- Dentists short-term memory worse than controls
- Periodic health surveillance of DHCWs indicated
- Kidney disorders not correlated with surgery Hg vapour levels
- Safer handling of amalgam needed
- Further studies indicated on all members of the dental team

Burke F.J.T. Amalgam to tooth-coloured materials – implications for clinical practice and dental education: governmental restrictions and amalgam-usage survey results. J.Dent.2004:**32**:343-350.

CONCLUSION: From the responses received, it would appear that there are few restrictions worldwide to the placement of dental amalgam

AND, Composite use is increasing worldwide

Why amalgam?

- Cheap, easy to use
- Technique tolerant
- Familiarity
- Relatively good service life

…and, it is said to tolerate a breadth of clinical situations!!!

Amalgam:disadvantages

- Not adhesive
- Aesthetically poor
- Mechanical retention required

Do amalgam substitutes exist?

Indirect

Cast alloys

Ceramics

Resin-based materials

All of these are more than X4 as expensive as amalgam

Do amalgam substitutes exist?

Direct – small cavities

Resin composite

Glass ionomer

Does GI require more development for this indication?

Reinforced Glass ionomer materials

- Smaller particle size leads to faster reaction
- Higher loading brings improved physical properties
- Exhibits plastic features – can be condensed and packed
- Still a need for improved wear resistance
- Typical glass ionomer features

Burke FJT. Dent.Update: 2013:40(10):840-844.

Conclusions

In clinical situations where there are no adverse situations at work (such as high occlusal loading or an acidogenic plaque), certain restorations in reinforced GI materials (such as Fuji IX) may provide reasonable longevity.

However, the conditions for longevity are not readily identified.

Two of the studies (Scholtanus and Huysmans, 2007: Basso, 2013) demonstrate higher than desirable failure rates for GI restorations in posterior teeth, especially in the longer term.

Trevor's view

Until more high quality evidence becomes available, for practitioners using reinforced GI materials in loadbearing situations in posterior teeth, it is prudent to advise patients of the relative paucity of good quality evidence for the success of the restorations that they are placing.

Do amalgam substitutes exist?

Are reinforced glass ionomers an alternative?

Not really, *at present,*
because their wear resistance isn't good enough and they are soluble in dilute organic acids

GIs in posterior teeth – a medicolegal perspective

- Tell the patient that it *is* a glass ionomer that the evidence base is variable and limited
- Definitive restoration or long term provisional?
- The restorations may need re-surfacing with composite
- Alternatives are more expensive
- May not do harm

Semi-definitive dentistry?

Do amalgam substitutes exist?

Direct

Compacted gold

Gallium alloys

Resin-based composite

The current status of posterior composite restorations

Filler particle size is associated with polishability

Filler loading is associated with physical properties

Bonding of filler to resin, and filler characteristics, are associated with wear resistance

Amalgam restorations occupied 25% of the occlusal surface

Composite restorations occupied 5% of the occlusal surface

Welbury et al., Br.Dent.J. 1990:165:361

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

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

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

8 year evidence from dental practice

Pallesen et al.J.Dent.2013:41:297-306

- Dentists undertook a course on posterior composite placement
- Exclusion criteria were deep subgingival margins and inability to isolate
- **Cavity outline determined by caries lesion**
- Isolation with cotton rolls and suction
- Etch & rinse bonding agent, 2mm oblique increments of composite

8 year evidence from dental practice

- 2881 children, mean age 13.7years
- 4335 restorations placed by 115 dentists
- 49% of cavities were class I
- 3507 in molars
- Spectrum APH used for 88%, bonding agent Prime & Bond used for 94%

8 year evidence from dental practice

Overall failure rate: 2% failure per annum

22 year retrospective evaluation of posterior composites

- Retrospective, practice-based design
- 80 adult patients selected (from 980) – continuous attenders for 22 years, invited to attend for examination: 19 declined
- The remaining patients had 362 restorations
- Full dentition and normal occlusion
- Examined by 2 examiners (not the dentist who placed the restorations!) using USPHS

Rodolpho et al. Dent.Mater:2011:27:955-963

22 year retrospective evaluation of posterior composites

Overall failure was *circa* 2% per annum

34 papers, each with evaluation periods of >5 years.

RESULTS:
Poorer survival rates in molar teeth than in premolars

Multiple surface fillings more likely to fail than class I

CONCLUSION:“Composite restorations have been found to perform favourably in posterior teeth, with annual failure rates of 1-3%”.

Laske M et al. Longevity of Class II restorations placed in Dutch general dental practices. IADR Boston, Abstract 1937

Full publication at:
J.Dent.2016:46:12-17.

Electronic patient files from 24 dental practices

358,548 restorations in 75,556 patients, 67 gdps

AFR varied between 2.3% and 7.9%, mean 4.6% @10 years

Restorations in molars had higher AFR

AFR of composites was 4.4%, amalgam 5.1%, and GI 11.1%

Are success rates for posterior composite as good as for amalgam?

YES – and we aren't even comparing composite in its best situation

8 steps to ensure better light curing

(after Price R., 2010)

1. Wear orange safety classes so that you can see what you are doing

2. Re-position the patient so that you can see the restoration and access it with the light

3. Position yourself so that you can stabilise the light directly over the preparation

4. Stabilise the light so that the beam is perpendicular to the surface of the resin

8 steps to ensure better light curing

(after Price R., 2010)

5.Begin curing no closer than 1mm from the resin, then move as close as possible after 1 sec

6.Adjust the light guide so that you can operate the light comfortably

7.Ensure that the tip is free of damage and debris

8.Air cool or wait between curing cycles, depending on the heat proximity to sensitive tissues. (Test the temperature from the light on the back of your hand)

Stress is a function of materials

factors such as:

Polymerisation shrinkage

Modulus of elasticity/filler load

Degree of conversion

shrinkage **STRESS** is the problem

REDUCING POLYMERISATION CONTRACTION STRESS

Five ways:

1. Increase the filler loading
2. Reduce resin shrinkage
3. Reduce % resin conversion
4. Bulk fill low stress material
5. Use a high molecular wt. resin

Class I & II restorations in a low shrinkage stress

Work by the Practice-based research group, The PREP Panel

Methods

- Ethical approval obtained
- Five UK dental practitioners
- Each practice recruited sufficient patients to provide a minimum of 20 class I or II restorations per centre.
- Restorations assessed using modified USPHS criteria by an independent examiner along with the practitioner who placed the restorations

3M ESPE Filtek Silorane Criteria for restoration evaluation (*=unacceptable)
Modified from Ryge G,Cvar JF (1971)US Government Printing Office Publication. 7902244

Anatomic form

A: Restoration is continuous with existing anatomic form, not under contoured.
B: Restoration is under contoured but no dentine or base exposed.
C*: Sufficient restorative material is missing so that dentine or base is exposed.

Margin integrity

A: No visible evidence of a crevice along the margin into which a probe will catch.
B: Probe catches in a crevice along the margin, no exposure of dentine or base.
C*: Visible evidence of a crevice with exposure of dentine or base along the margin

Margin discolouration

A: No discolouration evident at margin.
B: Slight staining at margin
C*: Obvious staining, cannot be polished away.

Colour match

A: Restoration matches adjacent tooth structure in colour and translucency
B: Mismatch in colour and translucency but within an acceptable range.
C*: Mismatch in colour and translucency outside acceptable range.

Surface roughness

A: Smooth surface with no irritation of adjacent tissues.
B: Dull, matte surface, can be refinished.
C*: Shallow surface pitting is present. Rough, cannot be polished

Results

- 127 restorations placed in 72 patients
- 8 restorations lost to the trial, 70 restorations (recall rate 59%) of mean age 62 months (range 54 – 68 months) in 45 patients (28 female and 17 male) of mean age 53 years examined.
- The 70 restorations composed of 17 Class I and 53 Class II restorations

34% (n= 24) of the restorations involved the replacement of one or more cusps

74% (n=53) were placed under rubber dam

Why no post-op sensitivity?

Reported post-op sensitivity in evaluations of "conventional" posterior composite:

- Burrow and colleagues[2] - 4% of restorations exhibited sensitivity in daily function
- Zero post-operative sensitivity reported by Opdam and co-workers[3], although 19% of the teeth were sensitive to loading.
- Other studies reported 10% to 20% incidence of post-operative sensitivity at one week and one month recalls[4,5]
- Auschill and colleagues reported 6% overall post-operative sensitivity in a study of 600 teeth restored with resin composite with cavity depth being significantly associated with the occurrence of post-operative sensitivity[6] .

2.Burrow MF, et al. Effect of glass-ionomer cement lining on postoperative sensitivity in occlusal cavities restored with resin composite – a randomised controlled clinical trial. Oper.Dent.2009:34:648-655.

3.Opdam NJM, Roeters FJM, et al.Marginal integrity and postoperative sensitivity in class 2 resin composite restorations in vivo. J.Dent.1998:26:555-562.

4..Akpata ES, Sadiq W. Post-operative sensitivity in glass-ionomer versus adhesive resin-lined posterior composites. Am.J.Dent.2001:14:34-38.

5..Akpata ES, Behbehani J. Effect of bonding systems on post-operative sensitivity from posterior composites. Am.J.Dent.2006:19:151-154.

6.Auschill TM, Koch CA, Wolkewitz M, Hellwig E, Arweiler NB. Occurrence and causing stimuli of postoperative sensitivity in composite restorations. Oper. Dent.2009:34:3-10.

Take home message

Indications at 5 years are that a low shrink composite, Filtek Silorane, is a viable alternative for restoration of posterior teeth

No post-operative sensitivity because of its low shrinkage stress

Perceived difficulties with Silorane

and, some dentists didn't realise the benefits of low shrinkage stress!

- Needed its own dedicated 2-stage adhesive
- Only 2.5mm depth of cure
- Large filler particles
- Aesthetics suboptimal, other than A2
- Difficult manufacturing process

Novel Stress Relieving Monomer System

AUDMA

High molecular weight dimethacrylate– acts to lower volumetric shrinkage

AFM

Addition-fragmentation (AF) monomer

– Reacts into developing polymer network through terminal methacrylate bonds like other dimethacrylate monomers

– Central AF group can fragment and release stress

– Fragment may then polymerize into network in a lower stress orientation compared to its pre-fragmented state.

Filtek Bulk Fill/Filtek One Posterior Restorative: Advantages over Silorane

- One-step placement
- 5 mm depth of cure
- Can use dentine bonding agent of choice
- Therefore, faster than Silorane Bond
- Easier polishing due to nanofiller
- Potentially better aesthetics

BUT

- Still excellent stress relief
- Still excellent handling and sculptability

Bulk Fill Flowables provide:

- Potentially faster restorations in back teeth
  - Fewer steps than incrementally placed composites
- Potentially easier restorations in back teeth
  - Flowable viscosity provides easy adaptation
  - Potentially fewer voids

BULK FILL IS IN!

BULK FILL IS IN!

My new classification for **BULK FILL** materials:

BULK FILL BASE MATERIALS
(which need a capping because their wear resistance isn't good enough)

BULK FILL RESTORATIVE MATERIALS
(satisfactory wear resistance)

However, the bulk fill base materials are now history!

Early materials needed a “capping” because their wear resistance wasn’t good enough!

BULK FILL IS IN!

The new classification for **BULK FILL** materials:

BULK FILL RESTORATIVE MATERIALS
(satisfactory wear resistance)

Sonicfill:Potential benefits

- Single step filling of cavities of 5mm depth
- No need for packing instruments
- Low set-up and handling time
- Reduced potential for voids
- Satisfactory aesthetics

...but need to purchase the handpiece

...and you cannot shape fissures with a hand instrument

PREP Panel evaluation of Filtek Bulk Fill/Filtek One

12 dentists, use FBFR (shade A3) for 8 weeks
Respond to questionnaire

183 restorations placed:
23 Class I, 37% Class II, 27% MOD, plus cusp replacements, restorations in primary teeth and cores

PREP Panel evaluation of Filtek Bulk Fill/Filtek One

"Excellent handling & viscosity. Doesn't slump, good depth of cure and no post-operative sensitivity"

"Initially I didn't think there was a need for a Bulk Fill material but the longer I used it the better I felt about complete curing. Less shrinkage than Filtek Supreme – I have found an alternative!"

"Great material, looks great. Very convenient to place in 4mm increments – a good time saver. I would definitely buy!"

"Aesthetics good but heavily stained dentine shows through – problem to leave remove more dentine or leave and opaque out"

Conclusions:75% of evaluators would purchase
92% (n=11) would recommend to colleagues

3M Nanofiller Technology (Filtek One Bulk Fill Restorative)

Nanofiller technology enables …

- Good polish retention
- Management of opacity and translucency
- No voids
- High strength
- Good wear resistance

Another bulk fill with no capping

Contains a “shrinkage stress reliever”

HOT OFF THE PRESS

Shofu Bulk Fill Beautifil

Aura Bulk Fill (SDI)

VOCO Admira Fusion x-tra

Bulk fill might lead to high stress!

It is therefore important that the material that we use has demonstrable low shrinkage stress

In addition, polymerisation *shrinkage stress* increases in a thicker composite bulk

..also, with Bulk Fills you only get one chance at light curing!

Advantages of Bulk Fill Restorative materials

- Time saving, no need for complex layering technique
- Easier handling
- Fewer increments, fewer interface imperfections
- Simpler shade selection, due to fewer shades

How do manufacturers do it?

More potent/efficient initiator systems
Increasing the translucency of the filler
For some, improved resin systems

Cention N

"Retentive undercuts similar to that needed for amalgam is necessary" (Product profile)

- Amalgam alternative
- No primer or curing light, therefore quick, and bulk fill possible
- Non-adhesive cavity
- Indicated Class I & II
- F, Ca, OH release
- 4 instead of 11 steps
- More aesthetic than GI or amalgam

Ariston:Advantages

- Amalgam alternative?
- Quick application
- Bulk fill possible
- Non-adhesive cavity preparation
- Indicated Class I & II
- F, Ca, OH release
- White shade

Slide made in 2000

Research published after 12 months

Braun A-R et al. Clin.Oral.Invest. 2001:5:139-147

METHOD:
50 fillings placed in Ariston, 49 in Solitaire 1
Two examiners assessed the restorations at 9-12 months using USPHS criteria

6% failure at one year

Publication after 4 years

"The material failed clinically within the 18 month control period….16% due to marginal caries. Hypersensitivity also a reason for restoration replacement"

Merte J, Schneider H, Merte K.
Schweiz Zahnmed 2004:114:1124-1131

Disadvantages of posterior composite

- More technique sensitive
- More time consuming, more costly
- Need to learn new technique

But, patients like them!

Advantages of posterior composite

- Good aesthetics
- Conservation of tooth substance
- Low thermal conductivity
- Polishable at placement visit
- May be repaired easily
- No potential for galvanism
- Avoids the use of mercury

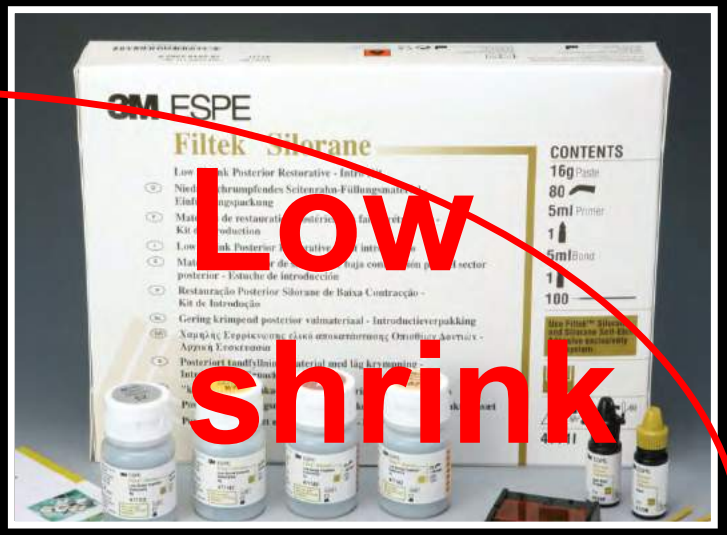
Posterior composites take 2.5 times longer to place than amalgam

Is bulk fill the answer?

Self Etch

+

Low shrink



5mm depth of cure

=

Amalgam substitute??

An amalgam substitute should:

Be self adhesive

Have 5mm depth of cure

Have low shrinkage stress

Have good physical properties and good wear resistance

Be quick & easy to place

Be non toxic

Adequate aesthetics for back teeth

Trevor’s view

Bulk fill restorative materials will be our amalgam alternative in the short to medium term

European Journal of Prosthodontics and Restorative Dentistry (2016) 24, 122-129

'Own-Label' Versus Branded Commercial Dental Resin

Some own label materials performed as well in testing as those from manufacturers in the field

Filler
Degree of Conversion
Own-Label
Private Label
Resin Composite
Flexural Modulus

ABSTRACT

conversion. However, a greater batch-to-batch variation in several mechanical and physical properties of the own-label materials was noted.

However, greater batch to batch variation in several mechanical & physical properties of the own-label materials was noted

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INTRODUCTION

The dental materials market is competitive and the product cycle of "new" dental resin-based composites replacing older types may be rapid. Resin composite materials, which are becoming increasingly used by dentists worldwide,[1] are the subject of a large volume of research which aims to improve reliability, durability and clinical longevity and their associated properties such as polymerisation shrinkage stress,[2,3] polymer conver-

Avoiding post-op sensitivity with posterior composites

Use a so-called self etch or Universal Material, AND do not etch the dentine

Use a low shrinkage stress composite

Ensure good adaptation at the gingival margin

Ensure adequate light luring

Use a reliable manufacturer's material

University of Birmingham Masters in Advanced General Dental Practice

Has been running for 14 years

Distance version commenced February 2013

University of Birmingham Masters in Advanced General Dental Practice

Six modules

Informed & informing clinician (20 credits)

Contemporary dental practice (20)

Medical and surgical management of oral disease (20)

Oper. Dent 1:Aesthetic dentistry and endodontics (20)

Oper. Dent.2:Fixed and Removable Prosthodontics (20)

Running a clinical business (20)

Case study 30 credits, Audit project 30 credits:
When completed, a total of 180 PG credits = MSc

Reasons to adopt minimal intervention

- Patients like it (if you advise them of your philosophy)
- Teeth like it (fewer die!)
- It's easier for dentists (fewer die: better for their blood pressure!)
- Lawyers hate it (fewer dentists get sued!)
- We now have the materials to make this work

But, others are still adopting an invasive approach (and being sued!)

Thank you for listening

Contact me at:
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