Summary of: Longevity of conventional and bonded (sealed) amalgam restorations in a private general dental practice

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FULL PAPER DETAILS

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Online article number E3
Refereed Paper – accepted 22 September 2008
DOI: 10.1038/sj.bdj.2009.9

Objective To compare and contrast the longevity of conventionally placed dental amalgam restorations with those placed using bonding techniques. **Design** Retrospective survival analysis (Kaplan Meier) of dental amalgam restorations placed by a single operator in a private general dental practice. **Subjects and methods** The records relating to dental amalgam restorations placed between 1 August 1996 and 31 July 2006 were sourced. The details of these were placed into a database that permitted flexible interrogation. Survival data on conventionally placed amalgams (C) and those bonded with either Panavia Ex (PE) or Rely X ARC (RX) were exported into a statistical package to permit survival analysis by the method of Kaplan and Meier. **Results** The number of restorations available for analysis were C = 3,854, PE = 51 and RX = 1,797. Percentage survival at one year was C = 96.29, PE = 95.65, and RX = 97.58. Percentage survival at five years was C = 86.21, PE = 76.35 and RX = 82.59. A Log Rank test demonstrated no statistically significant difference ($p > 0.05$) in survival between the restoration types. Amalgam restorations bonded with PE or RX exhibited an acceleration of failure rate around 1,000 days post-placement. Further survival analyses of the method of restoration *versus* type of restored teeth (molar/premolar) and cavity preparation (Class I/II) showed no significant difference in the survival curves in respect of type of restored tooth. In the comparison of Class I and II cavities, the survival curves for the restorations differed significantly ($p < 0.0001$), however when the curves for the Class I restorations alone were compared, no significant difference was found ($p = 0.2634$). This was also the case for the Class II restorations ($p = 0.2260$). **Conclusions** Within the limitations of the study, bonding amalgams, compared to placing them conventionally, afforded no significant benefit upon restoration longevity. This, coupled with the emerging trend of an accelerating decline in longevity of bonded amalgams from 1,000 days onwards and with the greater cost, challenges the justification for routine bonding of amalgams.

EDITOR'S SUMMARY

Hard on the heels of a research paper in which I bemoaned the loss of a national database of virtually priceless information on dental treatment provision comes this example of individual practitioners undertaking research to inform their own goals of best practice and patient care. Additionally, the Commentary highlights points not infrequently made on these pages in relation to the surprising complexity of the research process if the outcomes are to have sound scientific value and be robust enough for further application.

Much goes through our minds each time we use a material or employ a particular technique. Is this the best solution? Is there anything I could do to make this last longer, look better, function more effectively? Do other clinicians get as good results, worse outcomes or about the same? With treatment for every patient being, by definition, individual in nature it makes discovering the answers to the questions so much more difficult so that the resolution is often expressed by the familiar 'well it works well in my hands'. A sentiment that many a practitioner might reasonably describe as his or her own evidence based decision making.

In this study the decision to place either a conventional or adhesively bonded amalgam restoration was based purely upon the prevailing standard operating procedure of the operator at the time the restoration was required. The finding that bonding amalgam restorations has no significant effect upon the longevity of the restoration compared to conventionally placed amalgam restorations might be surprising to some; equally, if one suspected that this might be the case then disclosing the evidence to show that it is, is both exciting and satisfying.

Concluding that the lack of any obvious long-term benefits of bonded amalgams, with their associated increased cost of placement, questions the validity of routinely bonding amalgams, the authors present us, and the literature, with an important piece of the jigsaw of restorative dentistry. While not the complete picture the fragment helps to inform the whole and many fragments from many practices would provide a bigger image still.

The full paper can be accessed from the *BDJ* website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 206 issue 2.

Stephen Hancocks,
Editor-in-Chief

DOI: 10.1038/sj.bdj.2009.51

IN BRIEF

- Bonding dental amalgams conferred no significant benefit upon restoration longevity compared to placing such restorations conventionally.
- From 1,000 days onward the decline in restoration survival accelerated for the bonded amalgams.
- The lack of any obvious benefit upon longevity and greater cost of bonded amalgam restorations challenges the wisdom of their routine provision.

RESEARCH

COMMENT

General practitioners and their patients provide a huge reservoir of clinical information, but much of this incredibly important data never sees the light of day. There are relatively few studies arising from general practice but there need to be far more. Bonsor and Chadwick's paper demonstrates how challenging this can be.

Perhaps I can take this opportunity to encourage more general practitioners to collect and analyse their practice data. While practice management software is now very comprehensive, do you enter everything of importance when you record the placement of the restoration? You probably include the lining and restorative materials but do you record the size of the cavity, the occlusal relationship, the vitality test?

This study, while including a large number of restorations, is not the 'gold standard' of a randomised clinical trial (RCT); it is a 'field study'. To consider this topic in an RCT you would need 60 paired restorations, ie one of each restoration type per patient in identical cavities in similar types of mouths, with at least 50 patients being examined to provide the trial results at whatever termination date was decided.

Retrospective studies are much easier to perform than RCTs but they can be problematic. Are the records good enough to establish a valid baseline? Were there any changes to the techniques used over the period? Did the materials change? You might have been using the same trademarked material for ten years but has the manufacturer changed the formulation without telling anybody? This is a particular problem with composite materials. Did you follow the manufacturer's instructions religiously or did you tinker with your technique to suit circumstances? How many patients have been lost to follow up?

Many retrospective studies have too little baseline information to be reliable. This applies particularly to studies of restorations that may last ten or more years. Not only can the records be incomplete but the number of patients lost to follow up can be large. I know of one bridgework study where 75% of patients were lost. The remaining 25% who were examined cannot be a statistically sound sample; the bridges in the 75% could all have failed!

Returning to bonded amalgams, could the occlusal relationship be a factor in success or failure? Would you expect the same outcome from an MOD that replaces a cusp as you would from a minimal DO? The records used in this study presumably did not cover these questions.

Making these points is not intended to denigrate the paper but principally to draw attention to the difficulties of doing such a project. We should all regard every patient as a subject in a clinical study and collect full and standardised records of every procedure. Then general practice will become the centre for clinical research activity.

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AUTHOR QUESTIONS AND ANSWERS

1. Why did you undertake this research?

This work was originally undertaken as part of an MSc thesis at the University of Bristol. Amalgam restorations are still extensively placed in general dental practice and there has been a trend in recent years to utilise a bonding agent when placing amalgams for the theoretical benefits this may provide. Very little clinical research in dentistry is carried out in general dental practice whilst most clinical care is provided in that setting. It was interesting therefore to examine the longevity and behaviour of conventionally placed amalgam restorations and those placed using a bonding technique over a long period (ten years) by the same operator. The conclusions are very relevant in restorative dentistry and particularly so as the study was conducted in the general dental practice environment.

2. What would you like to do next in this area to follow on from this work?

The performance of the restorations in the study will be monitored in the years to come. This will be interesting to confirm or otherwise our impression of time dependent failure of the bonding systems. Although inevitably these products are highly likely to be off the market in 10 years time the data gleaned will be of value. The monitoring systems used for this study have been shown to work well and will form a platform for further practice based durability studies.