Journal of Dentistry 52 (2016) 1–7

Contents lists available at ScienceDirect

Journal of Dentistry

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

Review article

Incisal coverage or not in ceramic laminate veneers: A systematic review and meta-analysis

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ARTICLE INFO

Article history:
Received 29 December 2015
Received in revised form 16 June 2016
Accepted 17 June 2016

Keywords:
Dental laminate
Dental veneers
Tooth preparation
Esthetics
Dental
Ceramics
Dental porcelain
Systematic review

ABSTRACT

Background: There is no consensus on whether incisal coverage is a risk or a protective factor in preparations for ceramic veneers.
Objective: The aim of this systematic review and meta-analysis was to evaluate the survival rates of preparation designs for ceramic veneers with and without incisal coverage.
Methods: Primary clinical studies with the following characteristics were included: 1) studies related to ceramic laminate veneers and 2) prospective or retrospective studies conducted in humans. From the selected studies, the survival rates and failures rates for ceramic veneers were extracted according to preparation design, with or without incisal coverage. The Cochran Q test and the I^2 statistic were used to evaluate heterogeneity. Metaregression, meta-analysis were performed.
Two reviewers searched in the MEDLINE (Pubmed) and Cochrane Central Register of Controlled Trials (Central) electronic databases, from 1977 to June 5, 2016, without language restrictions.
Results: Eight studies out of 1145 articles initially identified were included for risk of bias and systematic assessment. No study was identified for crystalline ceramic veneers. The estimated survival rate for laminate veneers with incisal coverage was 88% and 91% for those without incisal coverage. Incisal coverage presented an OR of 1.25.
Conclusions: Irrespective of the preparation designs, with or without incisal coverage, ceramic veneers showed high survival rates. As regard implications for future clinical research studies, randomized clinical studies are necessary to compare preparation designs with and without incisal coverage, and to provide clear descriptions of these preparation designs.

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1. Introduction

Many different protocols have been indicated for laminate veneers, varying with respect to thickness, crown length, type of material, incisal coverage, and preparation methods. However, data about the relationship between complications and preparation design remain questionable, as there is no consensus on whether incisal coverage is a risk or protective factor for the teeth receiving ceramic veneers [1–21].

Three types of preparation design are generally used for ceramic veneers: feathered incisal edge (window), butt joint or incisal bevel, and palatal chamfer [22,23], nevertheless, it is important to note that even for prepless veneers, incisal coverage can be increased.

In previous systematic reviews on the survival rates of preparation designs for ceramic veneers [4,24,25], only one systematic review [22] addressed the question of the most indicated preparation design; but included only laboratory studies. One literature review [20] attempted to explore the survival rates of veneers based on different incisal preparation designs from both clinical and non-clinical studies. They affirmed that relatively few studies in the literature used survival estimates, that allowed for valid study comparisons between the preparation designs. Studies that preceded ours [4,20,22,24,25] showed the importance and difficulty of finding clinical evidence on this subject. Up to now, no systematic review has focused on incisal coverage in primary clinical studies, to determine the survival of veneers with and without incisal coverage.

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http://dx.doi.org/10.1016/j.jdent.2016.06.004
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A previous systematic review [26] that sought different outcomes, found that the influence of incisal coverage showed divergence among publications, and did not allow for the clinical outcome and survival rate to be associated with the preparation design. Thus, for the present systematic review, the authors searched the scientific literature again to find articles that contained tooth preparation descriptions, numbers of subjects, and failures, that would allow inclusion of a larger number of articles. With this in mind, the authors also sought to include retrospective studies.

The data on preparation for ceramic laminate veneers, obtained from randomized controlled trials (RTCs), have usually not shown the consequences of incisal coverage separately, thereby making it difficult to correlate the preparation design with clinical outcomes, and the effectiveness of protecting the remaining tooth structure. There is a gap in this information [2,3,5–7,9,10,12,14,15,18–21,24] that justifies the elaboration of a systematic review about preparation involving incisal coverage, in order to put forward scientific evidence. The aim of this systematic review was to evaluate the survival rates of different preparations for ceramic laminate veneers with and without incisal coverage, The null hypothesis was that the incisal coverage had no influence on the survival rates of ceramic veneers.

2. Methods

2.1. Eligibility criteria and search strategy

This review was conducted in accordance with the PRISMA guideline [27] and registered at the PROSPERO (CRD42015016606). The PICOS question (Population, Intervention, Comparison, Outcome, and Study design) was defined, where P = patients who received laminate veneers; I = ceramic veneers; C = (not applicable in the present study); O = survival rate; and S = RCTs and cohort studies. The question focused on was: "In patients with ceramic laminate veneers, will the tooth preparation designs, with or without incisal coverage, have an influence on the survival rates of these veneers?".

An electronic database search in the advanced mode, was performed of the PubMed and Cochrane Central Register of Controlled Trials (1977-June 5, 2016). The references of articles included were checked manually. There were no limitations on language. One study [28] was translated from Chinese and analyzed.

The final search strategy for the Medline database was: *((((ceramic*) OR porcelain*)) AND (((((failure) OR survival) OR success) OR clinical evaluation) OR follow up)) AND ((veneer*) OR laminate*)*, and for the Cochrane database, it was: *((laminate or veneer) and (ceramic or porcelain) and (dental or tooth or teeth) and (clinical and trial or clinical))*.

2.2. Study selection and eligibility criteria

Studies were selected by title and abstract for screening according to these inclusion criteria: A—studies about ceramic laminate veneers and B—human cohort studies (prospective and retrospective) and RCTs. Articles without abstracts were included for evaluation of their full texts. Articles without abstracts, or with abstracts providing insufficient descriptions to enable decisions, were included for evaluation of the complete text.

Eligibility was determined after evaluating the full texts according to the previously defined exclusion criteria: 1) cavity preparations and/or clinical procedures with no adequate or unusual descriptions (partial veneer/fragments/unusual bonding procedures); 2) case reports; 3) literature or systematic reviews, protocols, interviews, or *in vitro* studies; 4) isolated groups (tetracycline/bruxism); 5) not a ceramic veneer; 6) studies containing the same sampling (only the most recent study was considered); 7) studies without survival/success rate of veneers and the impossibility of calculating this data; 8) dropout rate higher than 30%; 9) no description of incisal preparation design or no number of each design.

2.3. Data collection process

Two calibrated reviewers (RBA, MNP) collected the data from the papers selected, and organized them in structured tables. Cohen's Kappa values between examiners was 0.91, and a new calibration was performed to solve disagreements. Discrepancies and doubts were settled by discussion and data checking; however, when these were not resolved by consensus, a third examiner (SM) was consulted.

2.4. Analysis of risk of bias

Two calibrated examiners (RBA, MNP) used the Newcastle-Ottawa Scale (NOS) [29] to assess the risk of bias in the studies included. Any disagreement between the reviewers was resolved by a third author (SM). With the NOS, studies can be awarded a maximum of one star for each numbered item within the Selection and Outcome categories. A maximum of two stars can be given for the comparability category. Thus, the following topics were used: A) Selection—A1) the representativeness of the exposed individuals was considered when the study population included men and women, with a minimum age difference of 35 years between the participants, A2) clear description of the exclusion criteria, with the non exposed group drawn from the same community as the exposed group, A3) ascertainment of the exposure factor by secure record, A4) demonstration that the outcome of interest was not present when the study started; B) Comparability—B1) two study control factors were used to measure the comparability between groups (B1′—standardized protocol for tooth preparation and B1″—no more than 2 operators to perform the clinical procedures) and C) outcome—C1) assessment of the outcome must be made independently, by blind assessment, or by reference to secure records, C2) the follow-up period must be long enough for outcomes to occur, in this case 3 years was considered, C3) subjects lost during the follow-up period, unlikely to introduce bias, must be fewer than 30%. Each study included could receive a maximum of 9 stars. Studies with $\geq$6 points were considered to have high methodological quality, while a score $<$6 points indicated low quality.

2.5. Study characteristics

In order to identify sources in heterogeneity of the outcome between the studies selected according to Table 2, detailed information about the way each study was conducted was displayed to facilitate analysis.

2.6. Measures and statistical analysis

Descriptive analysis and meta-analysis by using random effect models were performed based on the estimated survival of preparation designs for ceramic laminate veneers, with and without incisal coverage. This estimated survival rate (Kaplan-Meier) and variance were used for meta-analysis. If the article did not present the variance (or standard error), the authors calculated it by analyzing the number of failures and accounting for censorship during the follow-up time. These data were searched in the text, or a count was taken on a Kaplan-Meier graph. The Greenwood formula was used to calculate the variance assuming

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