

A systematic review and meta analysis of the longevity of anterior and posterior all-ceramic crowns



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ABSTRACT

Background: Clinical experience suggests that there is a difference in survival between anterior and posterior all ceramic restorations.

Objectives: This systematic review compared the difference in survival for full coverage all-ceramic materials used in adults to restore anterior or posterior vital teeth, not involved with fixed dental prostheses, but opposed by teeth.

Data and sources: Searches using Medline, Embase, and the Cochrane Library, including hand searches, with the inclusion criteria containing all-ceramic full coverage crowns in human adults over 17 years of age, prospective and retrospective studies, opposed by teeth, periodontal pocketing ≤ 5 mm, but not involving implant supported crowns or non-vital teeth. All papers were published between 1980 and March 2014 and available in English. From the selected studies a meta analysis was undertaken. The chi square test, I^2 , Begg's and Egger's test were analysed and the publication bias was assessed using a Funnel plot. The, Kappa scores were 0.63, 0.88, and 0.81 at each selection stage.

Study selections: Pooled data produced 1112 anterior crowns with 73 failures (6.5%) and 1821 posterior crowns with 166 failures (9.1%) with a follow up time from 36 to 223 months. Relative risk meta-analysis of the 14 selected papers demonstrated that anterior all-ceramic crowns were 50% less likely to fail than posterior all-ceramic crowns ($p = 0.001$).

Conclusion: These results indicate that there were differences in failure between anterior and posterior all ceramic crowns but the difference was only 3%. Although this has clinical relevance and some caution is needed when prescribing all ceramic posterior crowns the difference was relatively small.

Clinical significance: The clinically relevant results of this review, based on currently available data, demonstrate a need for some caution when considering posterior all-ceramic crowns. Lithium disilicate restorations were observed to have higher failures on anterior restorations and more research is needed to investigate why.

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1. Introduction

Ceramic materials are used to restore teeth, including the provision of conventional tooth supported single crowns. All-ceramic crowns are considered favourable in the anterior dentition compared to metal-ceramic and metal crowns due to their aesthetic qualities [1–3]. However, there is a debate over the appropriate use of these materials in the posterior dentition.

A direct comparison of the longevity of anterior and posterior all-ceramic crowns has not been made prior to this study [4–11]. Four of these systematic reviews [4–7,11] reported some data on the differences between anterior and posterior crowns, but focused on fracture rates [4–6,11] and survival [6,11] of all types of crowns. Wasserman et al. [11], reported the outcome of In-Ceram crowns, in a pseudo systematic review and within this paper three studies contained data comparing anterior to posterior crowns. From these, Scherrer et al. [12] reported, in a retrospective clinical trial, that a 'clear' difference was observed in the fracture of anterior (2% of 45 crowns) and posterior (13% of 23 crowns) for In-Ceram Alumina crowns over a five-year period. McLaren and White

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[13], reported 3 year survival rates of 98% for anterior crowns and 94% for posterior crowns, and Segal [14] in another clinical study, reported higher survival rates of posterior crowns (99.2%) compared to anterior crowns (98.9%).

Three other systematic reviews report partial data on the outcome for anterior and posterior all-ceramic crowns [4–6]. Wang et al. [5], reported the core or veneer annual fracture rates for all ceramic crowns over 3 years and observed statistically significant differences ($p = 0.001$) between anterior (0.6%) and posterior (1.1%) core fractures but not for veneer fractures. Heintze and Rousson [4] reviewed fracture rates of leucite-based all-ceramic crowns (Empress™) and observed statistical differences in the higher fracture rates for molar (6.7%) and canine (2.9%) crowns compared to premolars (2.9%) and incisor (2.3%) crowns. Pjetursson et al. [6] reported the 5-year survival of all-ceramic crowns compared to metal ceramic crowns. These authors subdivided all-ceramic crowns into four material groups, with all showing higher annual fracture rates on posterior teeth and statistical differences observed in glass-ceramics ($p = 0.008$) and InCeram™ ($p = 0.028$).

Despite these data there remain questions on the longevity and outcome of all-ceramic materials used to restore posterior teeth [3] irrespective of material and cause of failure. The aim of this review was to compare the difference in longevity for any all-ceramic material used to restore anterior and posterior teeth, not involved with fixed dental prostheses or posts.

2. Methods – eligibility and search strategy

Medline, EMBASE and the Cochrane library bibliographic databases were searched electronically. Two searches, were conducted on each database, and combined. The first search, used keywords linked to Medical Subject Headings (MeSH) and indicated as follows, (1) 'ceramics' (MeSH); (2) 'dental ceramic'; (3) searches (1) and (2) combined with 'or'; (4) 'tooth crown' (MeSH); (5) 'crowns' (MeSH); (6) 'tooth crown* or crown* or dental crown*'; (7) searches (4), (5) and (6) combined with 'or'; (8) searches (3) and (7) combined with 'and'. The second search used keywords, (1) 'dental porcelain' (MeSH); (2) 'dental porcelain* or dental laminate*'; (3) searches (1) and (2) combined with 'or'; (4) 'tooth crown' (MeSH); (5) 'crowns' (MeSH); (6) 'tooth crown* or crown* or dental crown*'; (7) searches (4), (5) and (6) combined with 'or'; (8) searches (3) and (7) combined with 'and'. Following this, the searches were combined with the primary outcomes. Manual hand searches were subsequently conducted through the Prosthodontic literature using the International Journal of Prosthodontics, the International Journal of Computerized Dentistry, the Journal of Oral and Maxillofacial Implants, and the Journal of Prosthodontics. "Grey literature" was also searched on OpenSIGLE (opensigle.insit.fr) and the Web of Science. These searches were complemented by communications with various authors and manufacturers of ceramic materials. All the articles were pooled and duplicates removed.

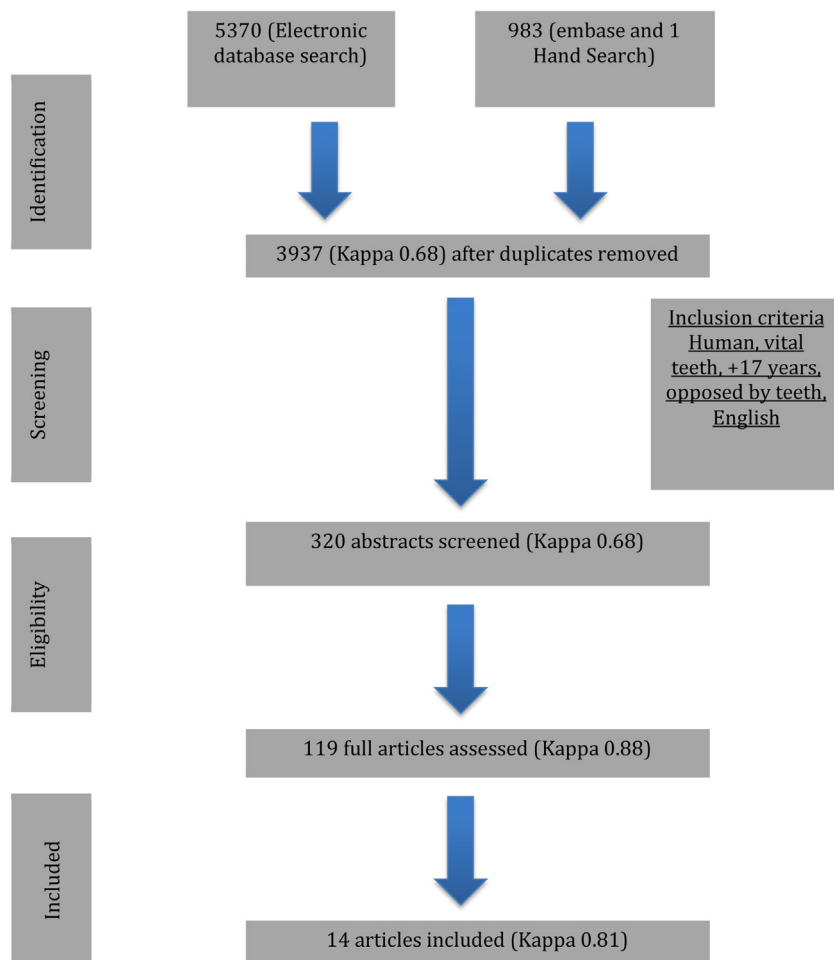


Fig. 1. Flow chart of the study selection.

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