

TITLE: Metal versus Acrylic Partial Removable Dentures for Patients with Periodontal Disease: A Review of the Clinical Effectiveness and Guidelines

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CONTEXT AND POLICY ISSUES

The Oral Health Component of the 2007-2009 Canadian Health Measures Survey found that 16% of Canadian adults had moderate periodontal disease, and 4% had severe disease, according to clinical measurements of changes in the gum and ligaments.¹ Treatment for periodontal disease involves the establishment of a dental hygiene regimen, with mechanical removal of plaque and calculus, and, in severe cases, topical antiseptics, systemic antibiotics or oral surgery.^{2,3} Chewing ability can be restored using any or a combination of strategies, including fixed or partial dentures, or implants.

Numerous designs for appliances and biocompatible materials have been developed. For removable partial dentures, metal frames are deemed preferable, but they may not be suitable for patients with periodontal disease, where progressive changes to the mouth, including tooth loss, may lead to the need for further modifications of the appliance. Acrylic (i.e., plastic) dentures are more readily modifiable than metal.

This report is an update from a published Rapid Response report on the clinical effectiveness and safety of acrylic removable partial dentures and metal removable partial dentures in patients with periodontal disease.⁴

RESEARCH QUESTIONS

1. What is the clinical effectiveness of metal partial removable dentures for patients with periodontal disease?
2. What is the clinical effectiveness of plastic (acrylic) partial removable dentures for patients with periodontal disease?
3. What is the comparative clinical effectiveness of metal versus plastic (acrylic) partial removable dentures for patients with periodontal disease?

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4. What are the evidence-based guidelines on metal or plastic (acrylic) partial removable dentures for patients with periodontal disease?

KEY FINDINGS

One study on the effectiveness of metal partial dentures was included. The study results suggested that removable partial dentures anchored with double crowns did not differ in terms of teeth loss when compared with fixed partial dentures or removable partial dentures anchored with clips.

METHODS

Literature Search Methods

This report makes use of a literature search conducted for a previous CADTH report. The original literature search was conducted in March 2015 on key including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The initial search was also limited to English documents published between January 1, 2005 and March 31, 2015. For the current report, database searches were expanded to cover the last 20 years and capture both English and French publications. French language documents published between January 1, 1996 and January 12, 2016; plus, English language documents published between January 1, 1996 and December 31, 2005, as well as between March 1, 2015 and January 12, 2016. The search of major health technology agencies was also updated to include documents published since January 1996.

Rapid Response reports are organized so that the evidence for each research question is presented separately.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria	
Population	Patients with periodontal disease requiring partial removable dentures
Intervention	Q1: Partial removable dentures made of metal Q2: Partial removable dentures made of plastic (acrylic) Q3: Partial removable dentures made of metal Q4 : Partial removable dentures made of metal or plastic (acrylic)
Comparator	Qs1, 2 and 4: Any comparator or no comparator Q3: Partial removable dentures made of plastic (aryclic)

Table 1: Selection Criteria

Outcomes	Qs1 and 2: Clinical effectiveness Q3: Comparative clinical effectiveness Q4: Recommendations
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized and non-randomized controlled trials, and evidence-based clinical guidelines

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 1995.

Critical Appraisal of Individual Studies

The included retrospective cohort study was critically appraised using Downs and Black checklist.⁵ A review of the strengths and limitations of the included study were described.

SUMMARY OF EVIDENCE

Quantity of Research Available

A total of 112 citations were identified in the literature search. Following screening of titles and abstracts, 95 citations were excluded, and 17 potentially relevant reports from the electronic search were retrieved for full-text review. Twelve potentially relevant publications were retrieved from the grey literature search. Of these potentially relevant articles, 28 publications were excluded for various reasons, while one publication met the inclusion criteria and was included in this report. Appendix 1 describes the PRISMA flowchart of the study selection.

Additional references of potential interest are provided in Appendix 2.

Summary of Study Characteristics

Muller et al.⁶ published a retrospective evaluation in 2013 of patient-related factors contributing to tooth loss and abutment tooth loss according to the type of prosthodontic treatment in periodontally compromised patients. The study included 90 patients, who were either members of the German Armed Forces (n = 67 or 74%) or private patients (n = 23 or 26%). Patients were treated for chronic or aggressive periodontitis with attachment loss of at least 3 mm or radiographic bone loss $\geq 30\%$ of root length at $\geq 30\%$ of sites. Active periodontal therapy was conducted in 1993 by the same periodontist. The study excluded patient who had implant supported fixed dental prostheses (FDP).

Prosthetic replacements included FDP (n = 29), removable partial dentures anchored with clips (RPDC) (n = 25) or double crowns (RPDD) (n = 25). Twenty-five patients, who served as the control group, were treated for periodontitis, but were not provided any prosthetic treatment. RPDD is a metal removable partial denture, but the study did not specify if the removable denture anchored with clips had a metal or resin base.

The authors evaluated the number of lost teeth after five to 17 years of the active periodontal therapy. The analysis included a Poisson regression model to evaluate the effect of prosthodontic treatment, age, socio-economic status, and diabetes mellitus on tooth loss.

Summary of Critical Appraisal

The study sample was based on convenience rather than statistical power estimation; therefore, comparison might not be powered to detect true differences between interventions. The temporal effect was not consistent, where 40 patients (44%) received their prostheses before the periodontal therapy. The delivery of a final prosthetic therapy before a comprehensive active periodontal therapy may have obscured the effectiveness of the different types of prostheses on tooth survival. Fourteen patients received a combination of different kinds of prostheses. They include: 4 RPDD and RPDC, 6 FDP and RPDC and 4 FDP and RPDD. Therefore, comparing tooth survival in these patients would not provide valid information about the effectiveness of the individual prosthesis on tooth survival.

Findings of this study might not be generalizable. A single operator conducted the periodontal therapy, so treatment outcomes may be limited to the skills and experience of that periodontist. Furthermore, it was not clear who provided the prosthetic therapy for these patients, and the study did not include details on the design, material used, and laboratory specifications used to fabricate these prostheses.

Summary of Findings

The authors reported that a total of 317 teeth were lost, including 273 teeth loss due to periodontal reasons or a mean loss of 3.5 teeth patient and three teeth per patient, respectively. Regression analyses identified prosthodontic treatment, age, lower socio-economic status, diabetes mellitus, mean initial bone loss and aggressive periodontitis as factors significantly contributing to tooth loss in general.

There was no statistically significant difference in the number of tooth loss between the three types of prostheses (p -value = 0.168). The mean tooth loss was 3.6 (1.3%), 3.4 (1%), and 4.2 (2.0%) for the FDP, RPDC and RRPD, respectively.

Limitations

There is an evidence gap on the evaluation of different prosthetic solutions for periodontically compromised patients. In the included study, one subgroup of patients had metal-base removable partial dentures, and the study did not have enough statistical power to detect true differences between the various included interventions.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

One study was identified and provided information about metal removable partial dentures which were anchored with double crowns (telescopic crowns) in patients with periodontal disease. The results of this study indicated that removable partial dentures anchored with double crowns did not differ in terms of teeth loss when compared with fixed partial dentures or removable partial dentures anchored with clips.

We did not identify studies on the clinical effectiveness of acrylic partial dentures versus no comparator or compared with metal partial dentures in patients with periodontal disease, or evidence-based guidelines on metal or plastic partial removable dentures for patients with periodontal disease.

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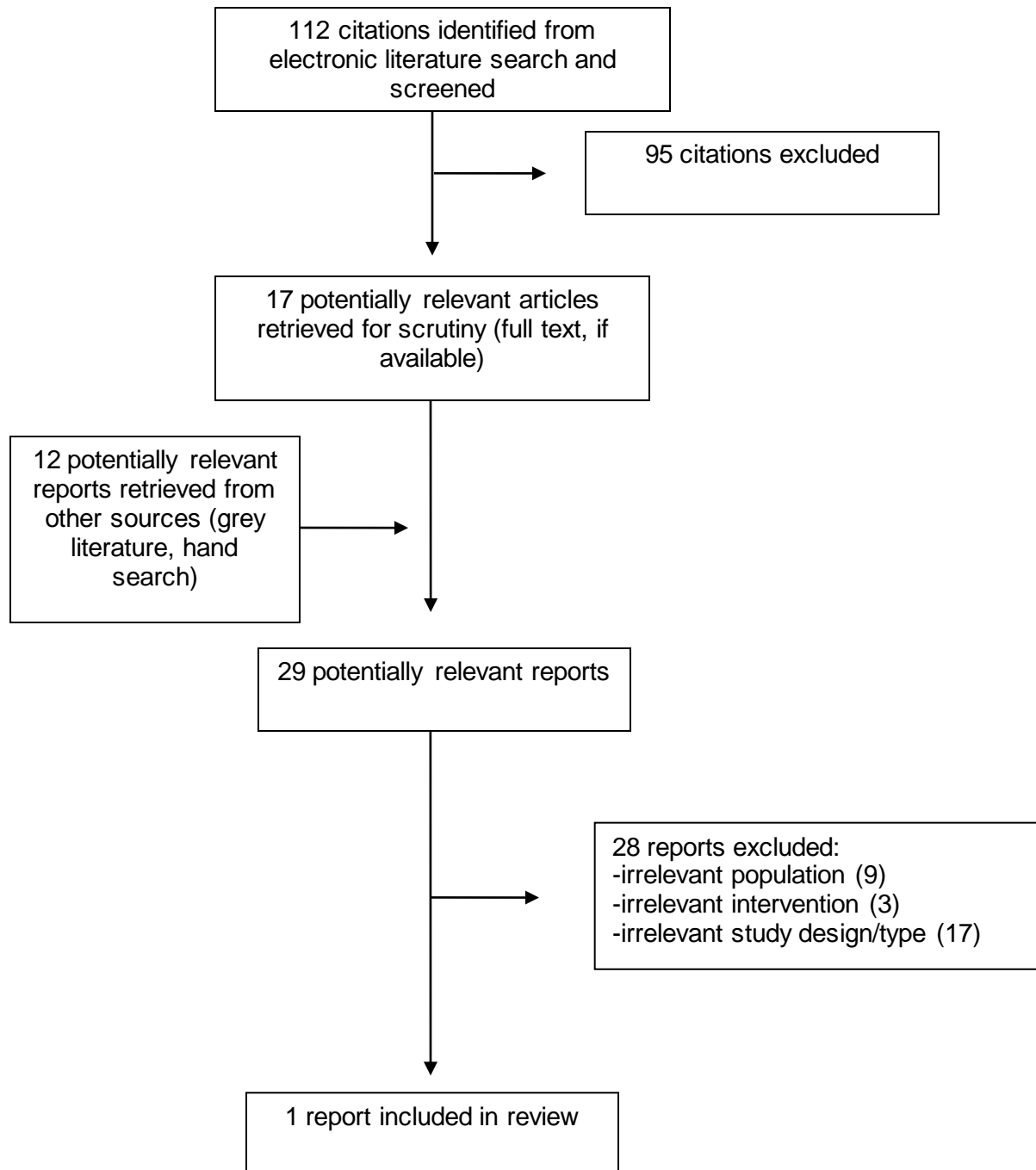
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APPENDIX 1: SELECTION OF INCLUDED STUDIES



APPENDIX 2: ADDITIONAL REFERENCES OF POTENTIAL INTEREST

Patient Population with Uncertain Periodontal Health Status

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