No clear evidence on the clinical performance of different removable prosthetic options in partially edentulous patients

Abstracted from

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Clinical performance of removable dental prostheses in the moderately reduced dentition: a systematic literature review. *Clin Oral Investig* 2016; **20:** 1435-1447.

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Question: What is the survival rate of the different removable prosthetic options in partially edentulous patients?

Data sources Medline/PubMed, Embase, BIOSIS/Ovid, SciSearch/DIMDI, Cochrane library, FIZ Technik Web and hand searches of the journals; Clinical Oral Investigations, International Journal of Prosthodontics, Journal of Prosthetic Dentistry, Deutsche Zahnärztliche Zeitschrift, Swiss Dental Journal, Journal of Dentistry and the Journal of Dental Research.

Study selection Randomised controlled trials, prospective and retrospective studies on survival rates of removable dental prostheses in the moderately reduced dentition with at least 15 participants having an observation period of at least two years, and a dropout rate of less than 25% were considered.

Data extraction and synthesis Two reviewers abstracted data. A qualitative summary of the included studies was carried out. Studies providing data that permitted a Kaplan-Meier analysis were included in meta-analysis.

Results The review included 19 studies, six of which were in multiple publications. Cast-metal framework dentures showed failure rates of 33% and 50% after five years. One study with a 25-year observation period reported failure rates of 50%. Proper pretreatment and a good recall scheme improve the results. Bilateral attachment prostheses showed failure rates of 11% and 30% after five years. Unilateral attachment prostheses showed failure rates of 75% after five years. Double-crown prostheses dentures show failure rates of 0% to 21.7% after three to six years.

Conclusions Within the limitations of this study, it seems that removable partial dentures, (RPD), given suitable pretreatment and follow-up regimes, can provide a satisfactory treatment option. Based on only one paper, they revealed acceptable results even over a very long observation period (25 years).

Commentary

Even in an era where implant prostheses have become a viable treatment option for replacing missing teeth, RPD still appears to be a good treatment alternative in some instances. This is especially true for patients with limitations regarding their age, financial, medical, anatomical or local pathology conditions, which make surgical procedures or implant placement not possible.[1-3] However, articles discussing the long term survival of RPD and their technical or biological complications are sparse. This is further complicated by the diversity in designs, materials, retention components and concepts used while fabricating an RPD. Hence, this systematic review entangled an important topic. However, the involved population is not clearly defined, where a population with moderately reduced dentition could imply patients with reduced number of teeth or with worn teeth. Besides, referring to a moderately reduced number might raise queries about the number of lost teeth and their distribution, which will give an idea about the nature of the denture support and which will definitely have an impact on the survival rate of the prosthesis and its supporting structures. A minimum number of three teeth was set as an inclusion criterion. However, this number is definitely not a moderate number, which might imply that the authors used the word 'moderate' to refer to something else other than the number of teeth. Besides, factors like oral hygiene of the patient, patient compliance and pretreatment protocols are confounding factors that might cause confounding bias. The research question seems to be also unclearly presented; is it only about reporting the survival rate of all RPDs collectively, irrespective of their designs and materials of construction, or will the review also compare the survival rate of the different RPD designs and materials? What is meant by survival rate? Is it about survival of teeth and/or partial denture? Does it involve technical complications like denture fracture and biological ones like caries? This remains totally unexplained until the 'study selection' section of the article, where the authors indicate that they converted the technical and biological failures into survival results based on available data. Nevertheless, variation in the clinical experience of the operators in the included articles definitely affects the results. It was left undefined with neither restriction nor subgrouping, which might increase risk of confounding bias. The unclear definition of the population, interventions, involved personnel and outcomes might have an impact on the applicability and external validity of the results and might introduce selection and confounding bias.

Despite the comprehensive search used for retrieving eligible articles in both electronic databases and relevant journals, it is, unfortunately, not reported whether a combined search strategy was used or whether the authors used 14 separate search strategies. This might result in reporting bias and raise suspicions about selection bias. Besides, using words like 'clinical', 'trial' or 'study' in the search might not be essential and might eliminate reviews, which act as sources for further eligible references or articles. Excluding articles with fewer than 15 participants and with more than 25% dropout rate might eliminate relevant studies and seems not to be necessary, because systematic reviews aim to increase power, confidence and generalisability of the results by combining participants from different studies and thereby increasing the overall number of participants. Out of 631 excluded articles, reasons for exclusion were only mentioned for 92, leaving 539 excluded articles with no reported justification. Eighty-four articles were excluded because they did not report survival rate statistics, although such articles were claimed eligible by the authors and were grouped in 'C' group. The latter is supposed to include articles reporting neither survival rates nor frequencies of survival. This again increases the risk of selection bias.

The inclusion of 13 studies in meta-analyses was reported in the PRISMA flowchart, although the authors stated that meta-analysis was not possible due to the vast diversity in the design, materials of the RPD, definitions of the outcomes and follow-up periods of the included studies. This created inconsistency about their findings and reporting.

In an attempt to overcome attrition bias, the review authors reported the results of some articles using best and worst case scenarios without examining sensitivity of the results to the used scenarios. Unfortunately, the authors also defined best case scenario based on the remaining patients after eliminating all dropouts and worst case scenario based on the number of patients originally included. These definitions contradict the definition introduced by Gamble and Hollis,[4] who stated that 'the 'best-case' scenario is that all participants with missing outcomes in the intervention group had good outcomes, and those with missing outcomes in the control group had poor outcomes and that the worst case scenario was just the opposite.' Descriptive synthesis of the included articles' results was, otherwise, performed in a very simple and organised way. However, controversy about definition of the outcomes in literature and the inability to differentiate among success rates, survival rates, failure rates and complications on a treatment or prosthetic level render interpretation of the results very difficult. These terminologies could have been differentiated as stated by Kapur *et al.*,[5] which could have developed better understanding of the results. In an attempt to make evidence based recommendations for RPD in partially edentulous patients, risk assessment of the included articles should have been performed. Unfortunately, this was not reported by the authors, which decreases confidence in the results and places clinical performance of RPD on the edge with neither a clear determination nor a clear definition of its survival rate.

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